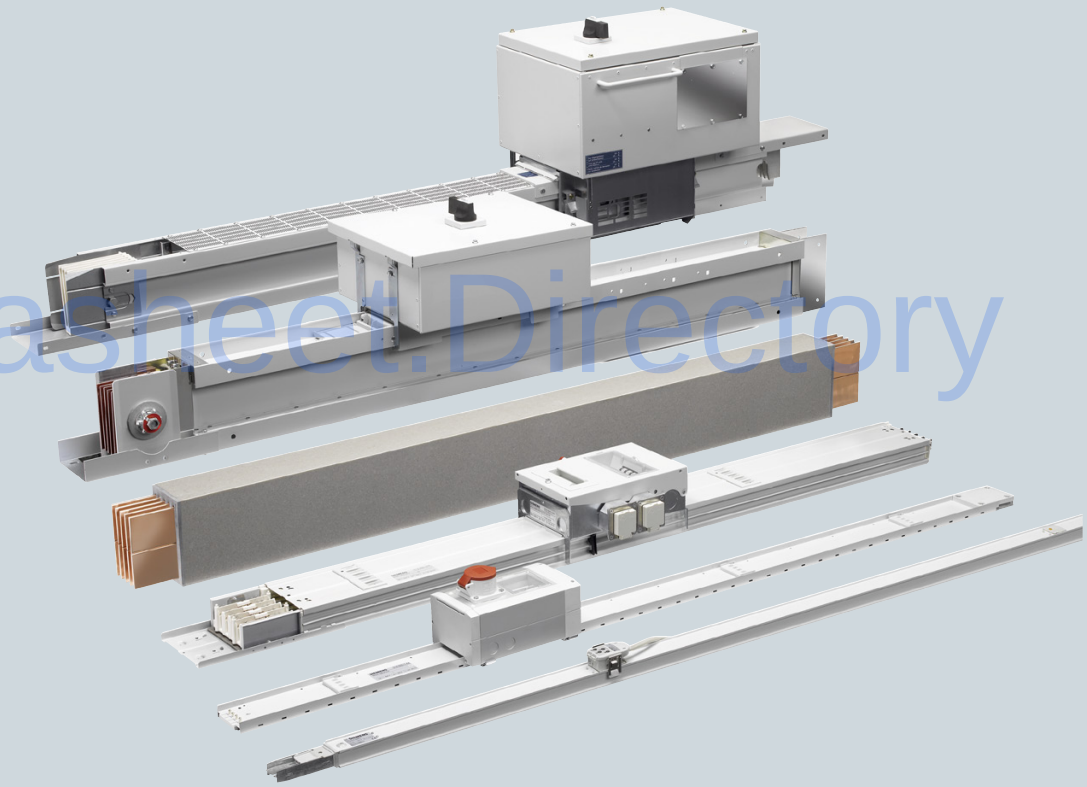
Busbar trunking system

SIVACON 8PS - Planning with SIVACON 8PS

Planning Manual · 09/2011



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Busbar trunking system SIVACON 8PS - Planning with SIVACON 8PS

Planning Manual

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Busbar trunking systems up to 6300 A

09/2011

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⚠CAUTION
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System overview

1

1.1 Overview of Siemens busbar trunking systems

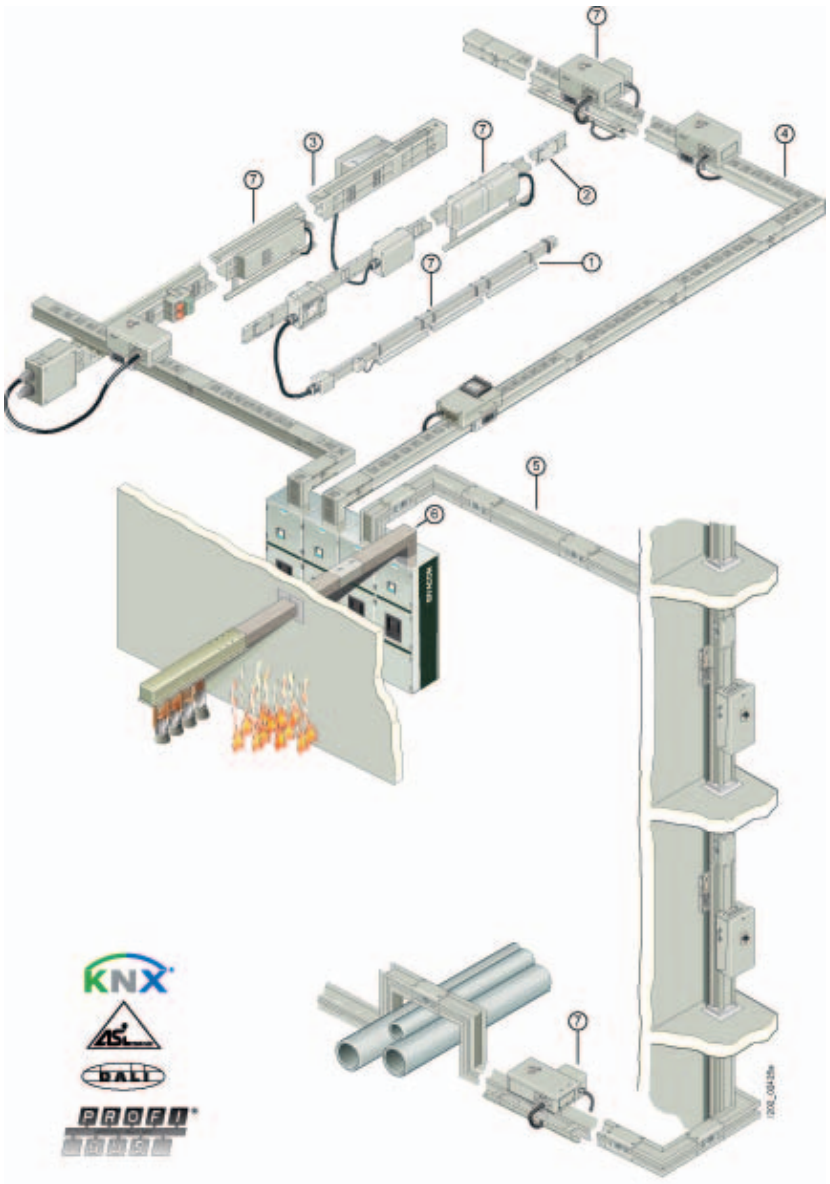


Figure 1-1 Overview of busbar trunking systems

① CD-K system
② BD01 system
③ BD2 system
④ LD system
⑤ LX system
⑥ LR system
⑦ Communication-enabled busbar trunking systems

Siemens supplies the following busbar trunking systems:

Up to 40 A

CD-K system

- Lower planning costs thanks to simple configuration
- Time-saving installation thanks to plug-in quick connector
- Optimum utilisation of the busbar line by fitting tap-off points on both sides
- Uniform current load of the CD-K system conductors by distributing the downstream tap-off plugs between the individual phases
- IP54 protection as standard (IP55 with additional equipment) ensures versatility of use
- Tap-off plugs make for speed and flexibility when changing load locations

For further information: see also CD-K system (Page 13) , catalogue LV 70

Up to 160 A

BD01 system

- Flexible power supply
- Variable junction units
- Quick and easy to plan
- Time-saving installation
- Reliable mechanical and electrical connection technology
- High stability and low weight
- Positive opening and closing of the tap-off point
- Versatile tap-off units
- Small number of basic modules
- Storage-friendly system
- High degree of protection (IP54) for side-mounted and downwards tap-off points under extreme ambient conditions, IP55 with additional equipment.

For further information: see also BD01 system (Page 17) , catalogue LV 70

Networked busbar trunking systems

- Networked functional expansions for combination with established tap-off units
- Applications:
  - Wide-area lighting control
  - Remote control and signalling in industrial environments
  - Consumption data acquisition for central power tap-offs
- KNX, AS-i, PROFIBUS bus systems
- Quick and easy to plan
- Flexibility in terms of expansion and changes
- Modular system
- Can be retrofitted to existing installations
- Simple contacting of the bus line using insulation displacement method
- Can be used with BD01, BD2, LD, LX systems

For further information: see also Networked busbar trunking systems for industrial and building applications (Page 20) , catalogue LV 70

Up to 1250 A

BD2 system

- Quick and easy to plan
- Time-saving and efficient installation
- Reliable and safe operation
- Flexible modular system with simple solutions for every application
- Power distribution system can be planned at an early stage without an exact knowledge of load locations
- Early readiness for operation thanks to quick and easy installation
- High degree of protection IP54 or IP55 for use in harsh industrial environments
- Innovative design: Omission of compensation elements to compensate for expansion

For further information: see also Planning with BD2 (Page 39) , catalogue LV 70

Up to 5000 A

LD system

The busbar trunking system for optimum power distribution in industry:

- Reliable and safe operation
- Quick and easy installation
- Space-saving compact design up to 5000 A in one enclosure
- Load feeders up to 1250 A
- IP34 degree of protection with air cooling (IP54 with sealed enclosure)
- Type-tested connection to distribution boards and transformers

For further information: Planning with LD (Page 107)

Up to 6300 A

LX system

The busbar trunking system for power transmission and distribution in buildings

- Reliable and safe operation
- Quick and easy installation
- Sandwich construction up to 5000 A (6300 A on request)
- Load feeders up to 1250 A
- High degree of protection IP54 or IP55 for use in harsh industrial environments
- Type-tested connection to distribution boards and transformers

For further information: Planning with LX (Page 151)

LR system

The busbar trunking system for power transmission under extreme ambient conditions (IP68)

- Reliable and safe operation
- Quick and easy installation
- Cast resin system up to 6150 A
- Safe connection to distribution boards and transformers
- High degree of protection IP68 for outdoor applications

For further information: Planning with LR (Page 213)

SIMARIS design dimensioning software

SIMARIS design makes dimensioning electrical power distribution systems easy, fast and safe.

To download a free demo version of SIMARIS design and to find out more, please visit:

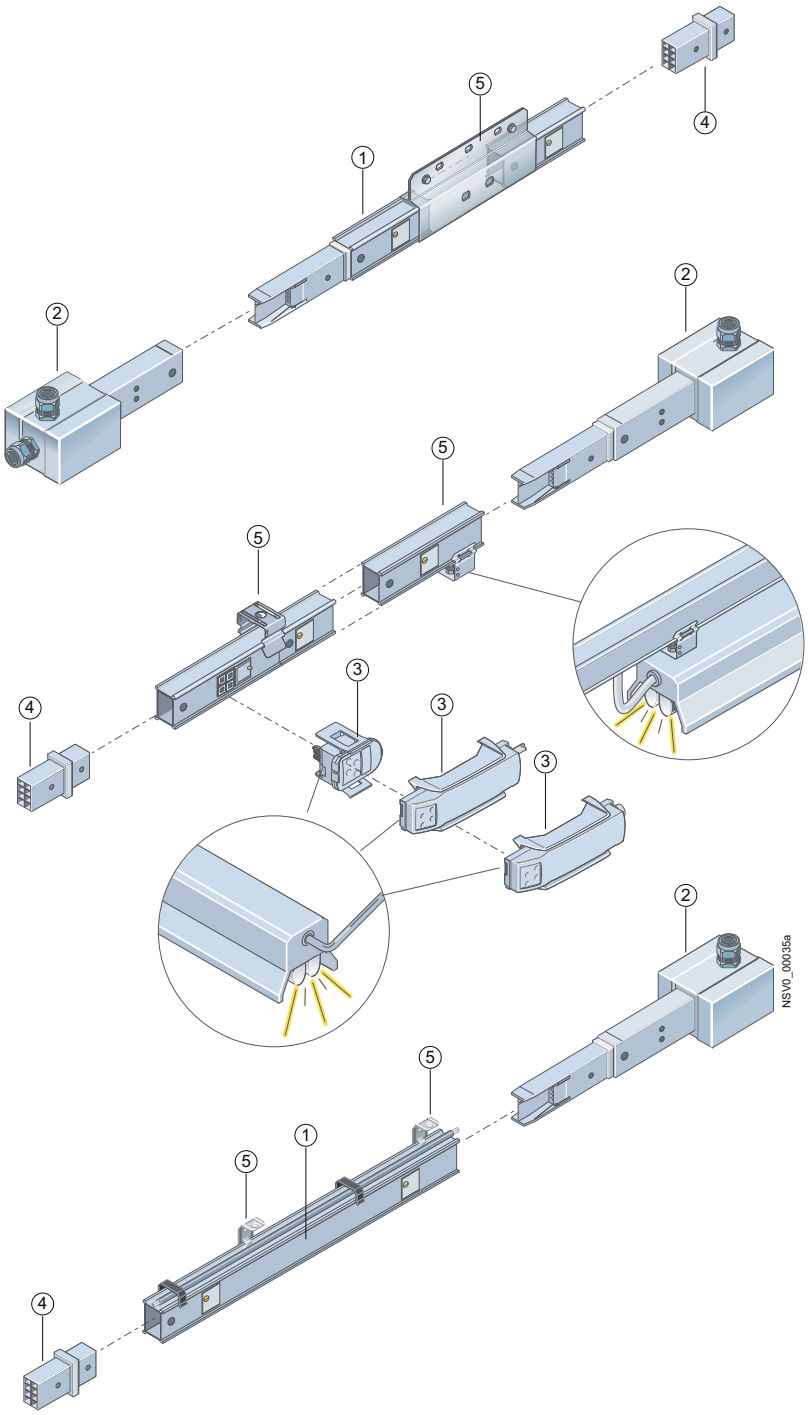
www.siemens.com/simarisdesign

1.2 CD-K system

System overview

The system has been designed for applications from 25 A to 40 A. It provides an efficient and flexible means of supplying power to lighting installations and small consumers. Typical areas of application include warehouses, department stores, storage facilities or clean room technology.

Rated current	2 x 25 A, 30 A, 40 A, 2 x 40 A
Rated operating voltage	400 VAC
Degree of protection	IP54, IP55
Spacing of tap-off points	every 1 m on one side every 0.5 m on both sides
Rated load feeder current	Up to 16 A



① Trunking unit
② Feeder unit
③ Tap-off plug
④ End cap
⑤ Additional equipment

Figure 1-2 System overview CD-K system

Connection method

The assembly of the trunking units as well as the feeder units is implemented by a straightforward and unmistakable plug-in connection. The PE path is established automatically when the housings are connected. An interlock mechanism engages when connecting the trunking units as well as the feeder units with the end caps. Two fixings prevent a loosening of the connections. No expansion compensation is required.

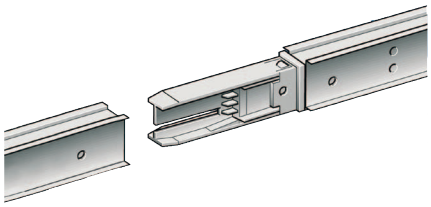


Figure 1-3 Connection method CD-K system

Tap-off plugs

Insulated enclosed tap-off plugs enable access to the current supply via tap-off points on the trunking units. They can be connected and disconnected by hand.

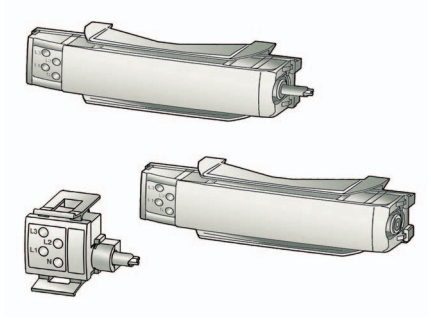


Figure 1-4 Tap-off plugs CD-K system

The tap-off plugs are available in 3 and 5-pole versions, with and without fuse as well as with connecting cables or plastic cable sleeves.

Fixing and mounting

The trunking unit profile allows attachment of fixing brackets which are also used for installing lighting fittings. They can be attached to any position of the trunking unit. The clearance between the suspension points is dependent on the load and may not exceed max. 3 m.

Figure 1-5 Fixing bracket on trunking unit

1.3 BD01 system

System overview

The BD01 busbar trunking system is designed for applications from 40 A to 160 A.

In the BD01 system, a single size supports 5 rated currents. In other words, all other components can be used across the power range for all 5 rated currents.

Rated current	40 A, 63 A, 100 A, 125 A, 160 A
Rated operating voltage	400 VAC
Degree of protection	IP54, IP55
Spacing of tap-off points	every 0.5 m on one side every 1 m on one side
Rated load feeder current	Up to 63 A

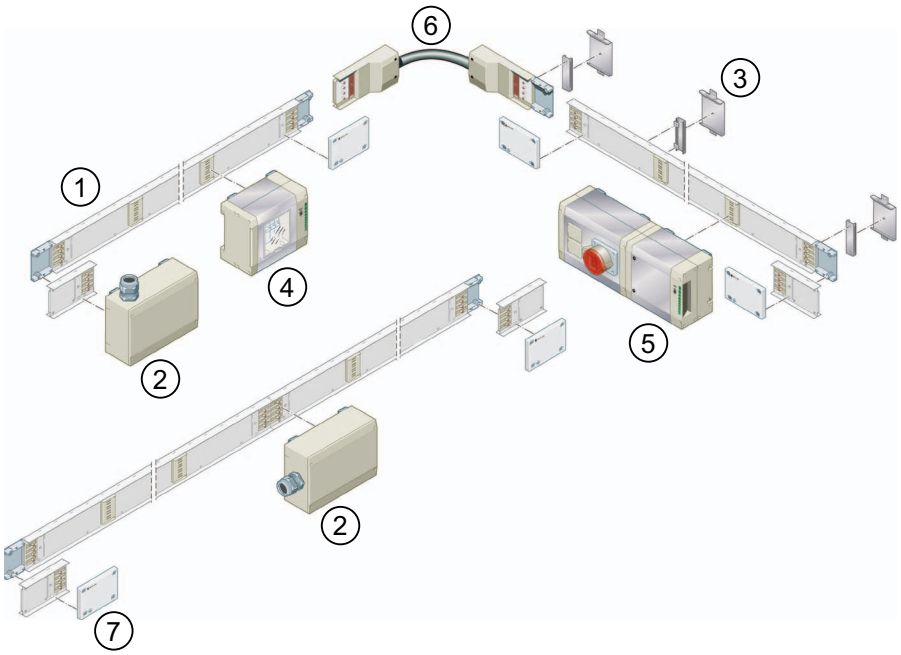


Figure 1-6 System overview BD01 system

① Trunking unit
② Feeder unit
③ Fixing bracket
④ Tap-off unit
⑤ Ancillary equipment unit
⑥ Junction unit
⑦ End cap

Connection method

The assembly of the trunking units – even with the end caps and feeder units – is fast and inherently safe. The trunking units or end caps are simply inserted into the lower housing of the joint block. Once the upper part of the joint block or end cap is fitted, a secure connection is established by simply tightening the four screws.

Figure 1-7 Establishing a safe connection

Tap-off units

Tap-off units are available in four different sizes to connect the loads and also with various components fitted, e.g. such as plugs, fuses, miniature circuit breakers or combinations of the aforementioned.

Figure 1-8 Tap-off unit BD01 system

Ancillary equipment units offer additional space for decentral function expansions. Thus, automation and control components can be installed directly on the busbar.

Fixing and mounting

The BD01 busbar is installed edgewise, with the tap-off points on the side using fixing brackets on the wall, ceiling or non-fixed installation. The mounting is implemented on the connection points using a universal fixing bracket. The system can also be fitted flat with the tap-off points pointing downwards. This reduces the required fixing interval by half.

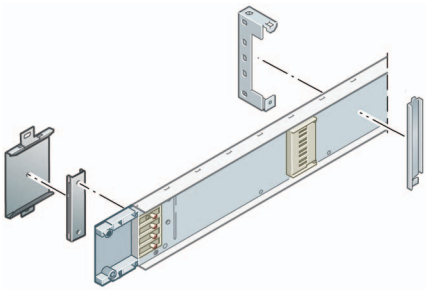


Figure 1-9 Mounting the BD01 system

Fire protection

If the busbar trunking system is routed through a fire wall or ceiling, it must have fire protection. Compliant with site requirements, Siemens offers fire protection class S90.

Ex-works equipment:

- External fire protection in the form of a kit for on-site mounting

Mineral mortar or fire protection mastic to seal the joints between busbar trunking system and component must be provided by the customer.

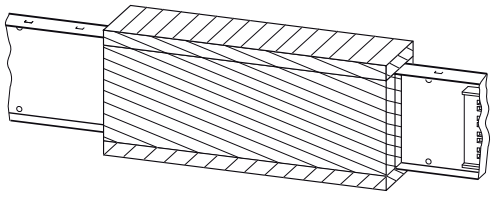


Figure 1-10 Fire protection BD01-S90

The approval documentation for Germany can be ordered separately:

- Approval kit BD01-S90-ZUL-D
  (approval certificate, wall signage and declaration of compliance)

1.4 Networked busbar trunking systems for industrial and building applications

The advantages of busbar trunking systems

The busbar trunking system has its advantages in the transport, distribution as well as switching and protection with electrical energy.

Integration of automation and building systems engineering into the Siemens busbar trunking systems results in further advantages and also increases the flexibility of the busbar trunking system.

The combination of standard tap-off units with standard ancillary equipment units guarantees enhancement in efficiency with the design, installation and operation.

The advantages of the system solution for planning

- Modular system
- Tested standard components
- Freedom in the selection of the bus system
- Use of most popular bus systems

The advantages of the system solution during commissioning

- Quick and simple installation
- Step-by-step commissioning possible
- Flexibility in terms of changes and expansions

The advantages of the system solution in operation

- Transparency of circuit states
- Energy costs recorded centrally
- Increase in system availability thanks to immediate detection of error location and type
- Preventive maintenance as operating hours and switching cycles are recorded

System concept networked busbar trunking systems

The tap-off units available as standard for busbar trunking systems can be combined with standard ancillary equipment units to create a system solution for networked busbar trunking. For reasons associated with design, an ancillary equipment unit based on a BD01 ancillary equipment unit is used for the BD01 busbar trunking system. A universal ancillary equipment unit suitable for the application in question is used for BD2, LD and LX systems.

Standard applications are factory-assembled prior to delivery by combining tap-off unit and ancillary equipment unit as appropriate. The bus line for the transmission of data signals is laid in a cable channel mounted on the trunking unit.

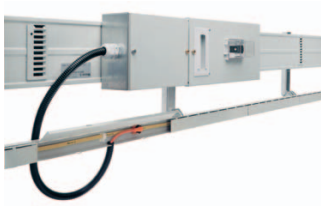


Figure 1-11 Switching and signalling with the BD2 system

Planning principles

2

2.1 Structure of the planning manual

It is not by any means easy to plan a power distribution concept involving the dimensioning of systems and devices. End user requirements have to be matched with the technical capabilities of the manufacturer. This planning manual will provide assistance as you plan and design the following busbar trunking systems from 160 A to 6150 A:

- BD2
- LD
- LX
- LR

Description of the individual systems

Each system has a dedicated chapter describing its technical characteristics and areas of application. Illustrations of the individual busbar trunking system elements also appear. All significant information relevant to the planning process is given particular emphasis and explained in detail.

Further information

You will find advice to help you to develop a ready-to-use planning solution under "Further information". These include specific dimensioning principles and detailed information about topics such as fireproof barriers and functional endurance.

Siemens can offer a range of services and engineering tools to assist you in drafting your specification. For an overview and explanation of functions and features, please see Tools and services (Page 282).

2.2 Busbar trunking system planning

2.2.1 Principles of busbar trunking system planning

Decision-making criteria affecting the creation of the power supply concept

When drafting a planning concept for a power supply, in addition to the applicable standards and regulations, you also need to clarify and address issues of cost and technology. Accordingly, when dimensioning and selecting electrical equipment such as distribution boards and transformers, rather than focussing on them individually, you need to aim to optimise their performance as part of a combined system.

All components have to be dimensioned sufficiently for loads both in rated operation and in the event of a malfunction. Furthermore, you must take the following important issues into consideration when drafting a power supply concept:

- Building type, use and design (e.g. high rise, low rise or number of storeys)
- Determination of load centres, identification of possible supply routes and locations for transformers and main distribution boards
- Calculation of the building's effective installed loads according to specific area loads as appropriate for the building's use
- Planning authority regulations and requirements
- Requirements set out by the utility company

Requirements to be met by power supply concepts

Planning will never produce just a single option for a solution. Rather, you will need to assess a number of possible options on the basis of issues relating to technology and cost. The following requirements are major factors:

- Simple and transparent planning
- Long service life
- High availability
- Low fire load
- Flexible adaptation to changes in the building

The solution: Siemens busbar trunking systems

In most applications, these requirements can easily be solved by using suitable busbar trunking systems.

It is for this reason that busbar trunking systems are increasingly being preferred to cable trunking by engineering consultants charged with designing systems for power transmission and distribution. Siemens offers busbar trunking systems from 25 to 6300 A:

- The CD-K busbar trunking system from 25 to 40 A for supplying power to lights and small loads
- The BD01 busbar trunking system from 40 to 160 A for supplying power to shopfloors with tap-offs up to 63 A
- The BD2 system from 160 to 1250 A for supplying power to medium-sized consumers in building and industrial applications
- The ventilated LD system for supplying power to consumers with medium power requirements in industrial applications
- The LX sandwich system for power distribution to consumers with high power requirements in building applications
- The LR cast resin system for power transmission under extreme ambient conditions (IP68)

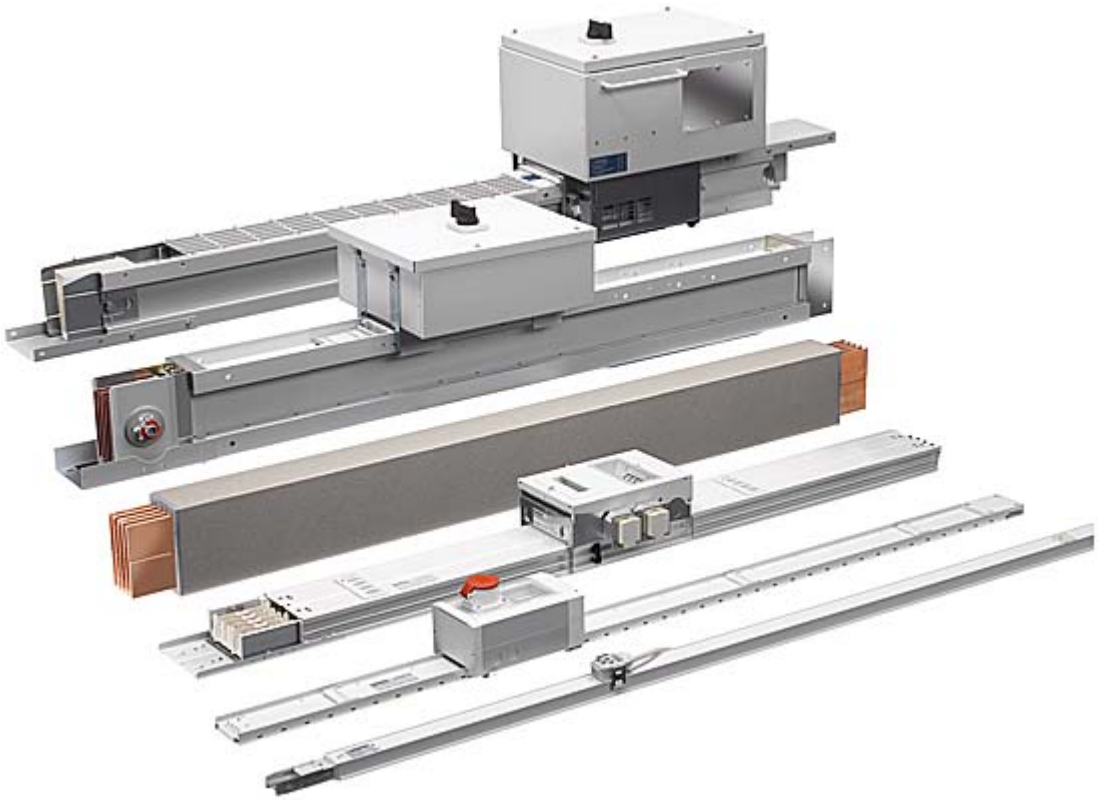


Figure 2-1 Siemens busbar trunking systems

2.2.2 Different types of busbar trunking systems and their functional scope

Requirements of the power supply

Specific requirements of power supplies and their individual components are typical of modern production facilities and in building technology today. This is particularly true of automated facilities.

The ability to retrofit new equipment or modify existing resources without interrupting active production is not only important for the continuous provision of the electrical power supply. It is also a vital requirement for production facilities operating on a multiple shift basis.

Increased safety and complex systems require a power distribution system which is able to respond to all requirements associated with costs and technology.

The CD-K, BD01, BD2, LD, LX and LR busbar trunking systems are type-tested low-voltage switchgear assemblies (TTA) compliant with DIN EN 60439-1 and -2. The CD-K, BD01, BD2 und LD systems consist of busbars, internal bar fixings, an external enclosure, fixing and connection accessories. The LX sandwich system and the LR cast resin system consist of busbars, fixing and connection accessories and an insulating foil, along with an aluminium enclosure (LX) or an enclosure made from epoxy resin (LR).

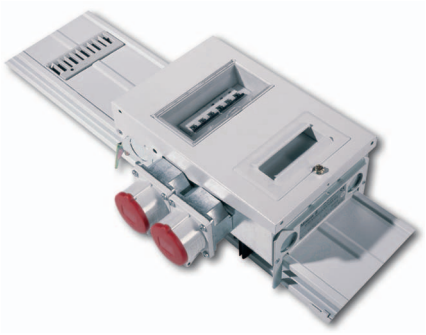


Figure 2-2 BD2 trunking unit with tap-off unit

Power transmission

Components of the busbar trunking system transmit power between transformers and low voltage power distribution systems and from the main distribution board to the service distribution board. Trunking units without tap-off points are used for the power transmission. In addition to the standard lengths, customers can select any lengths to meet their particular building requirements.

Power distribution

The main application of busbar trunking systems is power distribution. Current can't be taken from just a single point which is permanently installed such as a cable installation. Current tap-off units can be moved to any position within the entire system. To tap power at any given point simply requires positioning a tap-off unit at that location on the busbar.

The result is a flexible distribution system for decentralised power supply to a particular line or area. Tap-off points can be mounted on one or both sides of straight trunking units.

Depending on the requirements of the particular application, busbar trunking units with tap-off units for a rated current of 1250 A from a single tap-off point are available for tapping off power and connecting loads. The tap-off units can be equipped with fuses, fuse-switches, miniature circuit breakers or circuit breakers as desired.

To be able to change the tap-off units without disconnecting the busbar trunking run, the following requirements apply:

Requirements

- The PE contact on the tap-off unit leads during installation and lags during removal.
- The parts which are live during installation, removal or connection have complete protection against direct contact (degree of protection IP2x).
- Installation requires phasing to be correct.
- The tap-off unit must be isolated during installation and removal.

Figure 2-3 Tap-off units for flexible current consumption

2.2.3 A comparison of busbar trunking systems and cable trunking

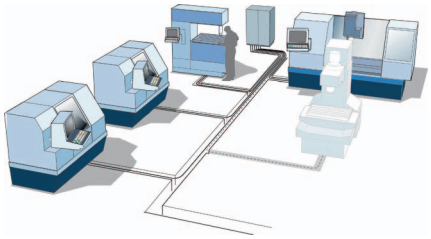
Comparison of features

Feature	Busbar trunking unit	Cable trunking
TTA	x	—
Mechanical safety	High	Low
Fire load	Low	High
Thermal characteristics	Ambient temperature compliant with DIN EN 60439-1 and -2 max. +40°C and +35°C average over 24 hours	Cable loads assume +30 °C in accordance with DIN 57298-4, Chap. 5.3.3.1/ DIN VDE 0298-4/2.88 .
Network topology	Transparent (line topology with load feeders connected in series via tap-off units)	Significant cable cluster at feeding point due to point-to-point power supply to loads from central power distribution system
Protective devices for loads	In the tap-off unit: facilitating direct and immediately traceable assignment to load locally.	Centrally in the distribution board: this means that assignment to the load cannot be verified directly. You have to rely on the cable and load being labelled correctly.
Space requirements	Low	High, since correspondingly large distribution boards are needed. Laying criteria (clustering, laying method, current carrying capacity, etc.) have to be taken into account.
Retrofitting in the event of changes to load feeders	Highly flexible thanks to tap-off points in the trunking units and large number of different tap-off units	Time-consuming and expensive. Additional cables need to be laid from the distribution board to the load.
Planning and configuration	Quick and easy using computer-assisted planning tools	Configuration is time-consuming and complex (distribution board and cable dimensioning, cable diagrams, etc.)
Dimensioning (current, voltage drop, neutralisation conditions)	Complex	Very complex
Troubleshooting expenditure	Low	High
Fireproof barrier	Type-tested, factory-built	Dependent upon installation quality on site
Functional endurance	Functional endurance tested to DIN 4102-12	Dependent upon installation quality on site
Electromagnetic interference	Low	Relatively high for standard cables
Installation	Few installation accessories and tools, short installation times	Extensive installation accessories and numerous tools, long installation times
Weight	Weighs up to 1/3 of comparable cable weight	Up to 3 times the weight of the busbar trunking system
Halogen-free, PVC-free [1)]	All tap-off units are halogen-free and PVC-free.	Standard cables are not halogen-free and PVC-free.

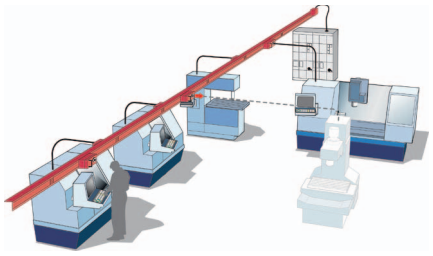
[1)] Details to be obtained from manufacturer

Planning made easier

Easy to plan, quick to install and flexible to use: Siemens busbar trunking systems are an efficient means of supplying power to any building. Power distribution can be planned precisely on the basis of total connected load and the type and number of loads. Planning tools such as SIMARIS design provide assistance. The line topology with load feeders arranged at regular intervals ensures transparency. All applications can be implemented quickly and compactly with standardised sizes.



In a cable trunking system, new loads have to be connected via an additional sub-distributionboard; this costs
both time and money.



On busbar trunking systems, tap-off units in the vicinity of loads ensure local transparency.

Increased safety due to high short-circuit rating and minimum fire load.

Advanced safety – both in respect of short-circuit rating and where fire load is concerned. BD2A 250 busbar trunking systems, for example, have a fire load of just 1.32 kWh/m, whereas comparable cable trunking systems (NYY 4 x 95/50 mm^2) are rated at 5.19 kWh/m. Furthermore, the busbars are halogen-free. Siemens busbar trunking systems feature high short-circuit rating. Furthermore, troubleshooting is made easier thanks to local load short-circuit protection.

High fire load with cables

Low fire load with busbars

2.2.4 Planning guidelines

Documentation aids

The planning manual "Planning with SIVACON 8PS" contains general principles and product-specific details for planning and dimensioning power distribution using SIVACON 8PS busbars.

For the complete planning of all main components from medium voltage, through transformers, to the power outlet for utility and industrial buildings, use of the application manual of TIP is recommended.

Advance planning

Infeed powers	Rated currents and short-circuit currents of standard transformers (Page 32)
Connected loads	Technical data of the systems (Page 33)
Demand factor	Planning example (Page 256)
Permissible voltage drop	Determining the voltage drop (Page 247)
Required protective measures	Degrees of protection for busbar trunking systems (Page 252)
Distribution systems (network structures)	Distribution systems (Page 254)
Selection of the power supply concept:	
Centralised with cable and subdistribution boards	A comparison of busbar trunking systems and cable trunking (Page 28)
Decentralised with busbar trunking systems	A comparison of busbar trunking systems and cable trunking (Page 28)

Draft planning

System sizing

Short-circuit rating	Technical data of the systems (Page 33)
Rated operating currents	Technical data of the systems (Page 33)
Calculation of voltage drop	Determining the voltage drop (Page 247)
Overload protection and short-circuit protection	Overload protection and short-circuit protection (Page 251)
Degree of protection depending on room type to DIN VDE 0100	Degrees of protection for busbar trunking systems (Page 252)

Consideration of busbar layout

	BD2	LD	LX	LR
Trunking units	Straight trunking units (Page 45)	Straight trunking units (Page 114)	Straight trunking units (Page 159)	Straight trunking units (Page 222)
Junction units	Junction units (Page 46)	Junction units (Page 117)	Junction units (Page 160)	Junction units (Page 223)
Tap-off units	Tap-off units (Page 54)	Tap-off units (Page 124)	Tap-off units and junction boxes (Page 166)	—
Fireproof barriers	Fireproof barrier (Page 261)			
Additional equipment	Additional equipment (Page 63)	Additional equipment (Page 129)	Additional equipment (Page 171)	Additional equipment (Page 230)

Installation

General installation instructions	Installation instructions for trunking units, incoming supplies, tap-off units and accessories Additionally for BD2: installation manual for the BD2 system (order no. A5E02126899) LD: installation manual for the LD system (order no. A5E02321029) LX: installation manual for the LX system (order no. A5E01120816) LR: installation manual for the LR system (order no. A5E00949793)

Creation of a specification

Specification texts BD2	Preliminary remark for specifications (Page 40)
Specification texts LD	Preliminary technical descriptions for specifications (Page 108)
Specification texts LX	Preliminary remark for specifications (Page 152)
Specification texts LR	Preliminary remark for specifications (Page 215)

You will also find the latest specification text modules for SIVACON 8PS on the Internet:

http://www.automation.siemens.com/tip/html_76/support/ausschreibung.htm

2.3 Rated currents and short-circuit currents of standard transformers

Rated voltage U_{rT}	**400/230 V, 50 Hz**			**525 V, 50 Hz**			**690/400 V, 50 Hz**		
Rated short-circuit current value U_{kr}		**4 % [1]**	**6 % [2]**		**4 % [1]**	**6 % [2]**		**4 % [1]**	**6 % [2]**
Rated power	**Rated current I_r**	**Initial symmetrical short-circuit current I''_k [3]**		**Rated current I_r**	**Initial symmetrical short-circuit current I''_k [3]**		**Rated current I_r**	**Initial symmetrical short-circuit current I''_k [3]**	
[kVA]	**[A]**	**[A]**		**[A]**	**[A]**		**[A]**	**[A]**	
50	72	**1933**	**1306**	55	**1473**	**995**	42	**1116**	**754**
100	144	**3871**	**2612**	110	**2950**	**1990**	84	**2235**	**1508**
160	230	**6209**	**4192**	176	**4731**	**3194**	133	**3585**	**2420**
200	288	**7749**	**5239**	220	**5904**	**3992**	167	**4474**	**3025**
250	360	**9716**	**6552**	275	**7402**	**4992**	209	**5609**	**3783**
315	455	**12247**	**8259**	346	**9331**	**6292**	262	**7071**	**4768**
400	578	**15506**	**10492**	440	**11814**	**7994**	335	**8953**	**6058**
500	722	**19438**	**12020**	550	**14810**	**9158**	418	**11223**	**6939**
630	910	**24503**	**16193**	693	**18669**	**12338**	525	**14147**	**9349**
800	1154	--	**20992**	880	--	**15994**	670	--	**12120**
1000	1444	--	**26224**	1100	--	**19980**	836	--	**15140**
1250	1805	--	**32791**	1375	--	**24984**	1046	--	**18932**
1600	2310	--	**39818**	1760	--	**30338**	1330	--	**22989**
2000	2887	--	**52511**	2200	--	**40008**	1674	--	**30317**
2500	3608	--	**65547**	2749	--	**49941**	2090	--	**37844**
3150	4550	--	**82656**	3470	--	**62976**	2640	--	**47722**

[1] u_{kr} = 4 %, standardised to DIN EN 60909-0 / DIN VDE 0102 Part 0 for S_{rT} = 50 ... 630 kVA

[2] u_{kr} = 6 %, standardised to DIN EN 60909-0 / DIN VDE 0102 Part 0 for S_{rT} = 100 ... 1600 kVA

[3] I''_k Unaffected transformer initial symmetrical short-circuit current in the case of connection to a mains supply with unlimited short-circuit power **taking into account the voltage factor and the correction factor for transformer impedance in accordance with DIN EN 60909/DIN VDE 0102 Part 0 (July 2002)**

Approximation formula

Transformer rated current	**Transformer short-circuit AC current**	
I_N [A] = k x S_{NT} [kVA]	$I''_k = I_N/Iu_k$ x 100 [A]	400 V: k = 1.45 690 V: k = 0.84

2.4 System selection criteria

2.4.1 Technical data of the systems

Selection of CD-K, BD01, BD2, LX, LD and LR

		CD-K	BD01	BD2	LX	LD	LR
Rated operating voltage U_e	VAC	400	400	690	690	1000	1000
Standard degree of protection		IP54, IP55	IP54, IP55	IP52, IP54, IP55	IP54, IP55	IP34, IP54 [1]	IP68
Rated current I_e	A	25 ... 40	40 ... 160	160 ... 1250	800 ... 5000, 6300 [2]	1100 ... 5000	400 ... 6150
Rated short-time withstand current I_{CW} (1 s)	kA	0.56 ... 0.85	0.58 ...2.5	5.5 ... 34	25 ... 150	55 ... 116	12 ... 100
Conditional short circuit rating I_{cf}/I_{cc} for TU to < 630 A	kA	[3]	[3]	[3]	100/65	120/100	[2]
Conditional short circuit rating I_{cc} for TU to < 800 A	kA	—	—	—	85	100	[2]
Conductor configurations							
L1, N, PE=enclosure		x	—	—	—	—	—
L1, L2, N, PE=enclosure		x	—	—	—	—	—
L1, L2, L3, N, PE=enclosure		x	x	—	x	—	—
L1, L2, L3, PE=enclosure		—	—	—	x	—	—
L1, L2, L3, PEN		—	—	—	x	x	x
L1, L2, L3, N, PE=busbar		—	—	x	x	x	x
L1, L2, L3, 2N, PE=enclosure		—	—	—	x	—	—
L1, L2, L3, 2N, PE=busbar		—	—	—	x	—	—
L1, L2, L3, N, (PE) [4], PE=enclosure		—	—	—	x	—	—
L1, L2, L3, 2N, (PE) [4], PE=enclosure		—	—	—	x	—	—

		CD-K	BD01	BD2	LX	LD	LR
Dimensions width x height							
for 40 A (Al, Cu)	mm x mm	30 x 42	90 x 25	—	—	—	—
for 160 A (Al, Cu)	mm x mm	—	90 x 25	167 x 68	—	—	—
for 400 A (Al)	mm x mm	—	—	167 x 68	—	—	90 x 90
for 1000 A (Al)	mm x mm	—	—	167 x 126	145 x 162	180 x 180	120 x 120
for 2000 A (Al)	mm x mm	—	—	—	145 x 287	240 x 180	120 x 220
for 4000 A (Al)	mm x mm	—	—	—	145 x 599	240 x 180	120 x 440
for 1000 A (Cu)	mm x mm	—	—	—	145 x 137	180 x 180	90 x 90
for 2000 A (Cu)	mm x mm	—	—	—	145 x 207	240 x 180	120 x 192
for 3200 A (Cu)	mm x mm	—	—	—	145 x 287	240 x 180	120 x 240
for 5000 A (Cu)	mm x mm	—	—	—	145 x 599	240 x 180	120 x 440
for 6150 A (Cu)	mm x mm	—	—	—	—	—	120 x 480
Fire load							
Trunking unit incl. tap-off points	kWh/m	0.1 ... 0.48	0.76	1.32 ... 2	—	—	—
Trunking unit without tap-off point	kWh/m	—	—	—	1.83 ... 16.32	4.16 ... 8.83	13.01 ... 86.96
per tap-off point	kWh	—	—	—	2.9	7.8 ... 10.8	2)
Voltage drop							
for 40 A (Al, Cu)	mV/m/A	2.917 5)	3.192 5)	—	—	—	—
for 160 A (Al, Cu)	mV/m/A	—	0.553 5)	0.519 5)	—	—	—
for 400 A (Al)	mV/m/A	—	—	0.544 5)	—	—	0.312 6)
for 1000 A (Al) 6)	mV/m/A	—	—	0.15 5)	0.127 6)	0.116 6)	0.156 6)
for 2000 A (Al) 6)	mV/m/A	—	—	—	0.059 6)	0.079 6)	0.068 6)
for 4000 A (Al) 6)	mV/m/A	—	—	—	0.03 6)	0.043 6)	0.043 6)
for 1000 A (Cu) 6)	mV/m/A	—	—	—	0.149 6)	—	0.148 6)
for 2000 A (Cu) 6)	mV/m/A	—	—	—	0.064 6)	0.089 6)	0.064 6)
for 3200 A (Cu) 6)	mV/m/A	—	—	—	0.033 6)	0.048 6) 7)	0.049 6)
for 5000 A (Cu) 6)	mV/m/A	—	—	—	0.02 6)	0.03 6)	0.025 6)

		CD-K	BD01	BD2	LX	LD	LR
Magnetic fields [8]							
for 40 A (Al, Cu)	µT	[2]	0.4	—	—	—	—
for 160 A (Al, Cu)	µT	—	0.6	2.8	—	—	—
for 400 A (Al)	µT	—	—	11.1	—	—	[2]
for 1000 A (Al)	µT	—	—	14.6	9.5	11.0	[2]
for 2000 A (Al)	µT	—	—	—	13.2	12.0	[2]
for 4000 A (Al)	µT	—	—	—	30.62	13.0	[2]
for 1000 A (Cu)	µT	—	—	—		[2]	[2]
for 2000 A (Cu)	µT	—	—	—	11.66	9.7	[2]
for 5000 A (Cu)	µT	—	—	—	37.22	14.4	[2]
Max. fixing distances							
Al systems	m	—	1.5 ... 3.1	2.5 ... 4.0	2.0 ... 3.0	5.0 ... 6.0	1.5 … 3.0
Cu systems	m	3.0	1.5 ... 3.0	1.5 ... 1.0	2.0 ... 3.0	2.0 ... 3.0	1.5 ... 3.0
Tap-offs can be plugged into tap-off points at 3 m intervals							
Up to 16 A	Units	10	6	11	—	—	0 [9]
Up to 63 A	Units	—	6	10	6	3	0 [9]
Up to 125 A	Units	—	—	10	6	3	0 [9]
160 A to 250 A	Units	—	—	6	6	3	0 [9]
315 A to 630 A	Units	—	—	4 [10]	4	3	0 [9]
800 A to 1250 A	Units	—	—	—	0 [9]	2	0 [9]

[1] With IP54, derating of up to 36% needs to be applied

[2] On request

[3] Usually equivalent to the protective devices installed (< I_{cw}), see the corresponding technical data

[4] (PE) = Clean earth

[5] Voltage drop data for 50 Hz 3-phase, cos phi=0.9, symmetrical load, distributed load decrease and single-side infeed

[6] Voltage drop data for 50 Hz 3-phase, cos phi=0.9, symmetrical load, concentrated load decrease and single-side infeed

[7] with LDC6 (I_e=3400 A)

[8] Magnetic field values measured with symmetrical load 0.5 m away from the busbar trunking system

[9] Tap-off units can only be connected between two busbar trunkings with a bolt-on joint block (fixed tap-off unit)

[10] Can only be used as of BD2-630

2.4.2 Areas of application for high-current systems

Selection of high-current systems

In principle, SIVACON 8PS offers three high-current systems. We recommend the following selection dependent upon area of application and ambient conditions:

Location of use	Areas of application		LX	LD	LR
Public buildings	• Banks • Insurance companies • Internet providers • Computer centres • Broadcasting stations • Shopping centres • Furniture stores	For power distribution in multi-storey buildings with a mainly vertical layout	X	—	—
		To avoid neutral conductor overload due to electronic loads subject to harmonics	X	—	—
		To prevent interference potentials in the busbar enclosure impairing the operating capability of loads	X	—	—
		Busbar run layout where space is restricted and requirements high.	—	X	—
		If structural conditions permit only a vertical layout for power distribution	X	—	—
	• Shopping centres • Furniture stores • Trade fairs • Airports • Hospitals • Clinics • Office buildings	For power distribution with a mainly horizontal layout and IP34 degree of protection	—	X	—
Industrial buildings	• Industrial buildings • Production environments	If pluggable tap-off units up to 1250 A are required	—	X	—
		When load tap-off points have to have high short-circuit rating and resistance to arc faults, e.g. I_{CC} = 100 kA / I_{cf} = 120 kA	—	X	—
		If pluggable tap-off units up to 630 A are sufficient	X	—	—
	• Industrial production under extreme conditions	For power transmission under extreme production conditions	—	—	X
		For power transmission outside closed buildings	—	—	X
		If a horizontal busbar run and the IP68 degree of protection are required	—	—	X

2.4.3 Selection on the basis of rated transformer data

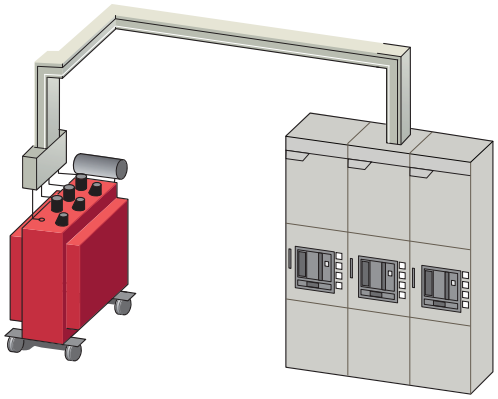


Figure 2-4 Connection of a transformer to a Siemens power distribution board

The table can be used to select the appropriate busbar trunking system on the basis of the transformer's rated current. The short-circuit rating of the LD, LX and LR busbar trunking systems is usually higher than the values for the transformer's sustained and peak short-circuit currents. However, this only applies if just a single transformer is used for the low-voltage supply. Higher short-circuit values are possible on ring or meshed networks or if transformers are connected in parallel in a low-voltage switchgear assembly. Such scenarios must therefore be given special consideration. Please refer to the technical data for the busbar trunking systems in question for specific data about short-circuit ratings.

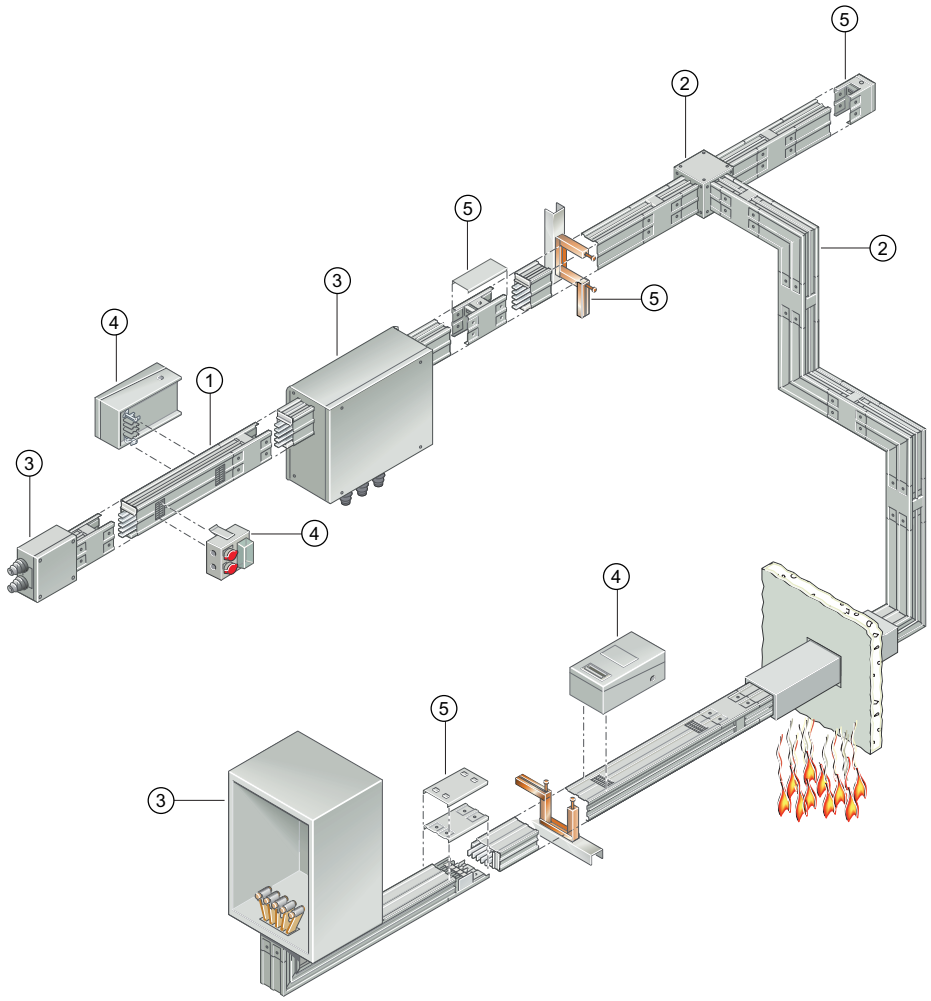
Rated power [kVA]	Rated current I [A]	Initial symmetrical short-circuit current I''_k (u_k=6%) [kA_{eff}]	Peak short-circuit current I_{pk} (u_k=6%) [kA]	LD size	Rated current I_e IP34 [A]	LX size	Rated current I_e IP54/ 55 [A]	LRC size	Rated current I_e IP68 [A]
630	910	16.19	38.58	LDA1	1100	LXA02/ LXC01	1000	LRA04/ LRC03	1000
800	1155	19.25	49.00	LDA2	1250	LXA04/ LXC02	1250	LRA06/ LRC04	1400/1350
1000	1444	24.06	61.24	LDA3	1600	LXA05/ LXC04	1600	LRA07/ LRC05	1700
1250	1805	30.07	76.57	LDA4	2000	LXA06/ LXC05	2000	LRA08/ LRC07	2000
1600	2310	38.50	98.00	LDA5	2500	LXA07/ LXC06	2500	LRA09/ LRC08	2500
2000	2887	48.11	122.50	LDA6	3000	LXA08/ LXC09	3200	LRA27/ LRC09	3200
2500	3609	60.11	153.10	LDA7	3700	LXA09/ LXC08	4000	LRA28/ LRC27	4000
3150	4546	75.78	192.90	LDC8	5000	LXC09	5000	LRA29/ LRC28	4600/5000

Additional values: see Technical data

Planning with BD2

3

3.1 System description



① Straight trunking units
② Junction units
③ Feeder units
④ Tap-off units
⑤ Additional equipment

Figure 3-1 Overview of BD2 busbar trunking system

The BD2 busbar trunking system is suitable for universal use. Designed for applications involving flexible power supplies and power distribution for consumers in industrial and commercial environments, it can also be used to transmit power from one supply point to another. In addition, the BD2 busbar trunking system can be used as a rising main busbar in high rise buildings.

3.2 System components

3.2.1 Preliminary remark for specifications

The BD2 busbar trunking systems can be offered as type-tested low-voltage switchgear and controlgear assemblies (TTA) to DIN EN 60439-1 and DIN en 60439-2.

The brand offered represents a complete system consisting of system modules, including elements for connection to the distribution boards such as brackets, straight trunking units, e.g. Z connectors, T connectors, and flexible junction units.

Trunking units with tap-off openings can be equipped with coded tap-off units. Tap-off units are protected against incorrect mounting. Depending on the type, the isolation of the tap-off units during removal is assured by a compulsory sequence of operations or by cautionary instructions.

If necessary, it is possible to equip the busbar trunking system with an asbestos-free fire barrier which conforms in the case of BD2C to the fire resistance class S 120 and in the case of BD2A to S 90 or S 120. The trunking unit's steel enclosure is made of moulded steel profiles to permit large fixing distances between suspension points. The enclosure is painted in a light grey colour (RAL 7035).

The external dimensions may not exceed 68 x 167 mm up to 400 A or 126 x 167 mm up to 1250 A. The connection of the individual systemmodules is implemented with state-of-the-art quick connection terminals with integral compensation for expansion. The system is protected against phase inversion. A mechanical, electrical and maintenance-free connection between two busbar trunking system elements can be established quickly and safely using conventional tools.

The conductors are made of aluminium or copper. The aluminium and copper conductors must be nickel-plated and tinned along their entire length. The fire load should not exceed the value stated in the technical specifications. Expansion compensation must be integrated into eachtrunking unit. Busbar trunking units should be able to be mounted both horizontally and vertically. Junction units may not be used to connect cables. Flexible junction unit are permissible as system modules of the busbar trunking system.

The following declarations of conformity must be included with the offer:

- DIN ISO 9001 QA certification
- Certificates verifying
  - that the fire barrier has been tested and approved
  - that functional endurance has been tested and approved

The general preliminary remarks are followed by a detailed description of the system as appropriate for technical requirements:

Technical data for BD2 busbar trunking systems

Rated current	_____ 1)
Degree of protection	IP52/IP54/IP55 2)
Mounting position	Horizontal/vertical 2)
Rated insulation voltage	690 VAC/800 VDC
Rated operating voltage	690 VAC
Rated frequency	50 – 60 Hz
Rated peak withstand current I_{pk}	_____ 1)
Rated short-time withstand current I_{cw} (1 s)	_____ 1)
Conductor material	Al/Cu 2)
No. of conductors (active)	5
Fire load	_____ 1)
Enclosure dimensions	
160 to 400 A	68 x 167 mm
630 to 1250 A	126 x 167 mm

1) Enter data for selected system size. See technical data.

2) Please delete as appropriate.

Note

The innovative design and construction of the BD2 busbar trunking system means that additional compensation units to compensate busbar expansion are not required. Prevailing length expansion caused by current heat is compensated in the quick connection terminal.

Furthermore, regardless of mounting position and degree of protection, the BD2 busbar trunking system can always be loaded at 100% of rated current. This only has to be reduced in the case of pure power transmission in the edgewise mounting position (to 0.9 x I_e).

3.2.2 Type code

Trunking units

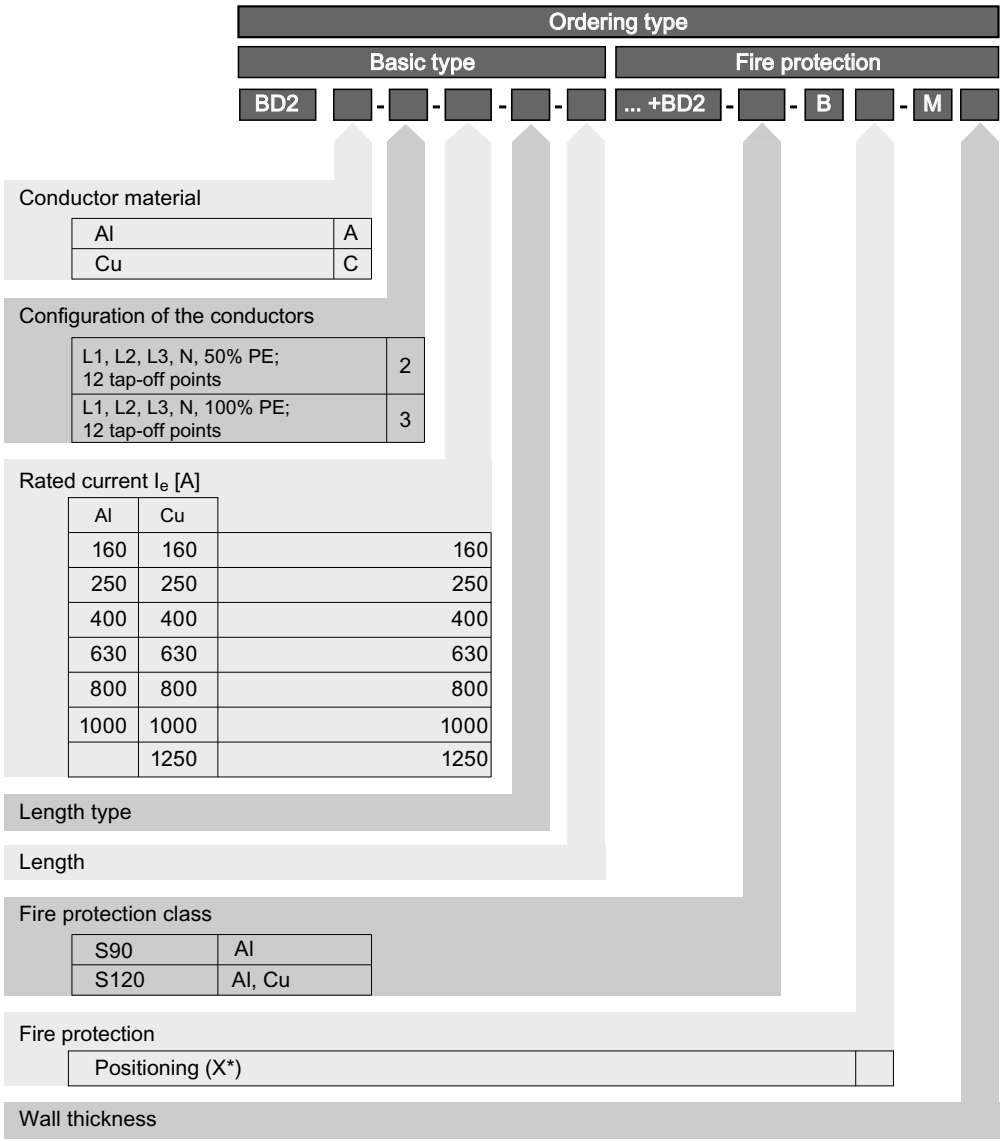
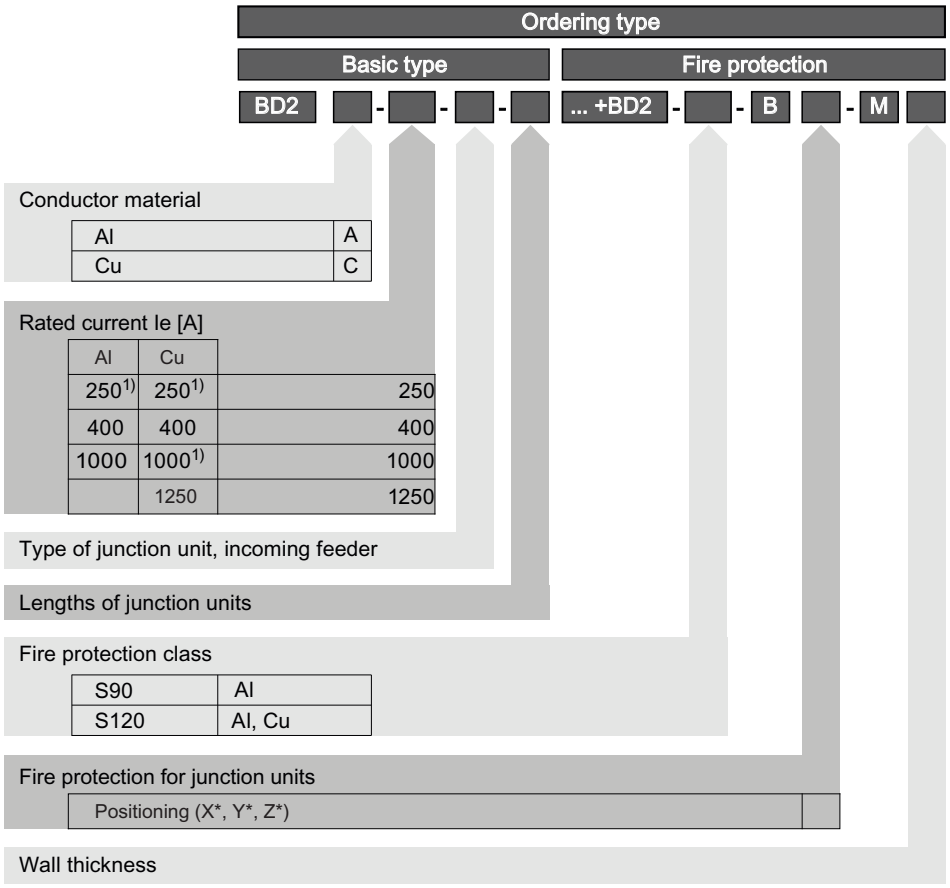


Figure 3-2 Type codes for BD2A/BD2C trunking units

Feeder units, junction units



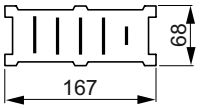
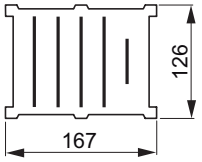
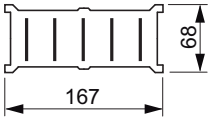
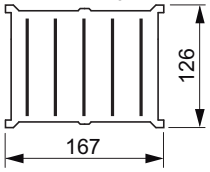
1) Feeder units only

Selection example for trunking units

A rated current of 1000 A is calculated for a project. Aluminium conductors shall be used. A 5-pole system has to be used. The cross section of the neutral conductor needs to be equal to the cross section of the phase conductor.

This results in type **BD2A-3-1000-**

Trunking unit sizes (cross sections)

	Size 1	Size 2
Conductor configuration 2	N L1 L2 L3 PE  160...400 A	N L1 L2 L3 mPE  630...1250 A
	BD2A-2, BD2C-2 trunking units	
Conductor configuration 3	N L1 L2 L3 PE  160...400 A	N L1 L2 L3 PE  630...1250 A
	BD2A-3, BD2C-3 trunking units, junction units, BD2A-..., BD2C-... incoming supplies	

Additional equipment is available for both sizes and conductor configurations.

Tap-off units with moulded-plastic enclosures up to 25 A and tap-off units with sheet steel enclosures can be used as tap-offs for size 1 up to 250 A and size 2 up to 530 A.

3.2.3 Straight trunking units

Straight trunking units are used to transmit electrical power and to supply loads.

Straight trunking units without tap-off points for horizontal and vertical installation

400 to 1250 A

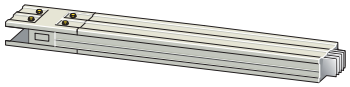


Figure 3-3 Straight trunking units without tap-off points

	Length	Type	
Standard lengths	1.25 m	BD2.-.-...-SO-1	
	2.25 m	BD2.-.-...-SO-2	
	3.25 m	BD2.-.-...-SO-3	
Optional lengths W	0.50...1.24 m	BD2.-.-WO-1W*	
	1.26...2.24 m	BD2.-.-WO-2W*	
	2.26...3.24 m	BD2.-.-WO-3W*	
Non-standard lengths (can be cut to length)	1.25 m	160...400 A	BD2.-400-WO-AL
		630...1250 A	BD2A-1000-WO-AL BD2C-1250-WO-AL

Straight trunking units with tap-off points for horizontal and vertical installation

160 to 1250 A

Figure 3-4 Straight trunking units with tap-off points

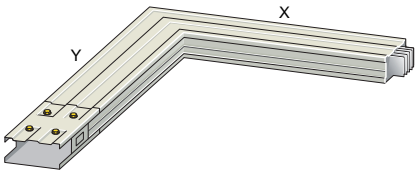
	Length	Type
BD2.-2 and BD2.-3		
Standard lengths with 12 tap-off points	3.25 m	BD2.-.-...-SB-3
Standard lengths with 8 tap-off points	2.25 m	BD2.-.-...-SB-2
Standard lengths with 4 tap-off points	1.25 m	BD2.-.-...-SB-1
Optional lengths with 8 to 12 tap-off points	2.26...3.24 m	BD2.-.-...-WB-3W*
Optional lengths with 4 to 8 tap-off points	1.26...2.24 m	BD2.-.-...-WB-2W*

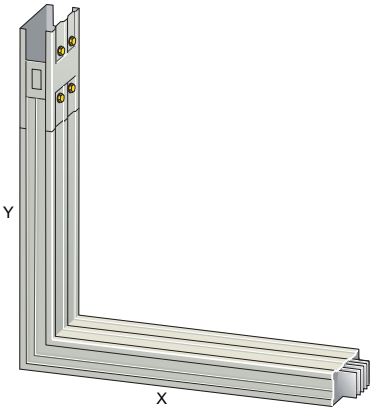
S Standard length
O Without tap-off point
W Optional length
* Optional length in m
B Tap-off points on both sides

3.2.4 Junction units

Junction units are used to adapt the layout to prevailing structural conditions.

Angled trunking units

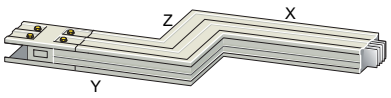


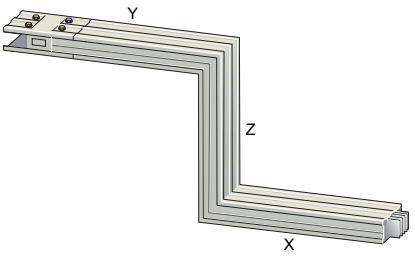


	Length	Type	
Standard length	X and Y = 0.36 m	160 ... 400 A	BD2.-400-L...
		630 ... 1250 A	BD2A-1000-L... BD2C-1250-L...
Optional length	X or Y = 0.36 ... 1.25 m	160 ... 400 A	BD2.-400-L...-X*/Y*
		630 ... 1250 A	BD2A-1000-L...-X*/Y* BD2C-1250-L...-X*/Y*

* Optional length in m

Z trunking units

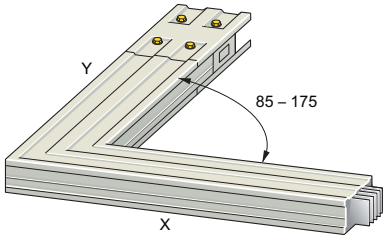


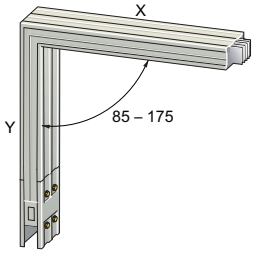


	Length	Type	
Optional length	X or Y = 0.36 ... 0.6 m Z ≤ 1.25 m	160 ... 400 A	BD2.-400-Z.-X*/Y*/Z*
		630 ... 1250 A	BD2A-1000-Z.-X*/Y*/Z* BD2C-1250-Z.-X*/Y*/Z*

* Optional length in m

Angled trunking units with angle configurable between 85° and 175° in 5° increments

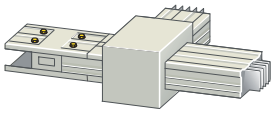




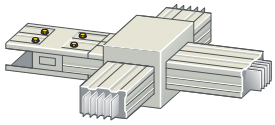
	Length	Type	
Standard length	X and Y = 0.36 m	160 ... 400 A	BD2.-400-L.-G*
		630 ... 1250 A	BD2A-1000-L.-G* BD2C-1250-L.-G*
Optional length	X or Y = 0.36 ... 1.25 m	160 ... 400 A	BD2.-400-L.-X*/Y*-G*
		630 ... 1250 A	BD2A-1000-L.-X*/Y*-G* BD2C-1250-L.-X*/Y*-G*

X*, Y* Optional length in mm
G* Required number of degrees

T and K units



T unit

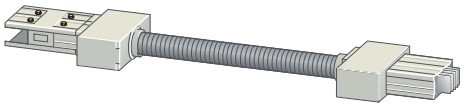


K unit

Length per leg	K unit type	
0.36 m	160 ... 400 A	BD2.-400-T.
	630 ... 1250 A	BD2A-1000-T. BD2C-1250-T.

Length per leg	T unit type	
0.36 m	160 ... 400 A	BD2.-400-K..
	630 ... 1250 A	BD2A-1000-K.. BD2C-1250-K..

Flexible movable trunking units in X/Y/Z direction



Length	Type	
1.25 m	160 ... 400 A	BD2-400-R
1,75 m	630 ... 800 A	BD2-800-R
Custom lengths up to 3.25 m are possible		

3.2.5 Feeder units

Feeder units are used to feed power into the busbar trunking system with single-core or multi-core cables as well as to feed power directly to low-voltage distribution equipment. The incoming supply can be set up as an end feed or a centre feed.

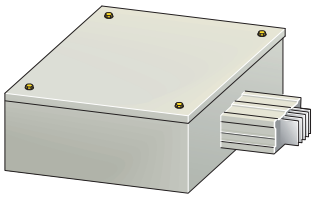
3.2.5.1 End feeder units

Common features

All end feeder units have the following common features:

Cables can be fed in from the front end. Units with cable compartments support cable entry from the side. In the case of multi-core conductor entry, a sectional entry flange with cable sleeves and cable propping bar is standard; in the case of single-core conductor entry, an aluminium plate is standard. The cables are connected using lugs and bolts. The bolts are supplied with the unit. When connecting 5-conductor cables you will need to remove the bridge between PE and N which will have been fitted prior to delivery. The phasing can be changed locally.

Incoming cable connection unit: Multi-core entry BD2.-...-EE, single-core design BD2.-...-EE-EBAL



End feeder units: Incoming cable connection unit

160...250 A	BD2.-250-EE(-EBAL)
160...400 A	BD2.-400-EE(-EBAL)
630...1000 A	BD2.-1000-EE(-EBAL)
630...1250 A	BD2C-1250-EE(-EBAL)

Incoming cable connection unit: Multi-core entry with cable compartment BD2.-...-EE-KR, single-core design with cable compartment BD2.-...-EE-KR-EBAL

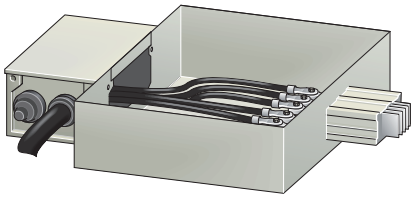


Figure 3-5 End feeder units: Cable entry from the side

160...400 A	BD2.-400-EE-KR(-EBAL)
630...1000 A	BD2.-1000-EE-KR(-EBAL)
630...1250 A	BD2C-1250-EE-KR(-EBAL)

Incoming cable connection unit with switch disconnector

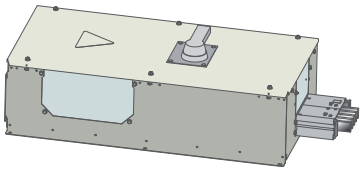


Figure 3-6 End feeder unit with switch disconnector

250 A	with 3-pole switch disconnector	BD2C-250-EESC
315 A	with 3-pole switch disconnector	BD2C-315-EESC
400 A	with 3-pole switch disconnector	BD2C-400-EESC
630 A	with 3-pole switch disconnector	BD2C-630-EESC
800 A	with 3-pole switch disconnector	BD2C-800-EESC

Cables can be fed in from three sides.

3.2.5.2 Centre feeder units

Common features

All centre feeder units have the following common features:

Cables can be fed in from three sides. The sectional entry flange with integrated strain relief can be converted to these positions. Aluminium cable entry plates for single-core cables as an alternative option. The cables are connected using lugs and bolts. When connecting 5-conductor cables you will need to remove the bridge between PE and N which will have been fitted prior to delivery.

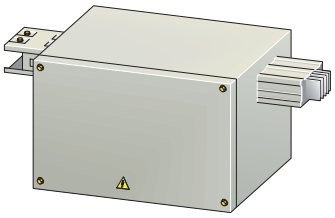


Figure 3-7 Centre feed

160 ... 400 A	BD2.-400-ME
630 ... 1000 A	BD2.-1000-ME
160 ... 400 A	BD2.-400-ME-MBAL
630 ... 1000 A	BD2.-1000-ME-MBAL

Important planning information:

A centre feed might be the best option for the distribution of high powers with small busbar cross sections. It is mounted in the centre of a trunking run between two trunking units. A single power supply cable provides power to the left-hand and right-hand trunking runs simultaneously. This means, for example, that a 1000 A centre feed can feed in 2000 A. In such cases you need to pay particular attention to the busbar system's overload and short-circuit protection.

You will need to provide protective measures in the following instances:

- If short-circuit protection is not being provided by the upstream protective device and/or
- If the overload is not set by the type and number of loads

There are two possible protective measures:

1. Use a centre feed unit with one coupling unit on the left of the incoming feeder and another on the right. The coupling unit is fitted with a protective device (fuse or circuit breaker) providing short-circuit and overload protection.
2. Use two end feeder units located in the centre of the trunking run. The two supply lines are fused separately in the distribution system.

3.2.6 Distribution board feeder

The distribution board feeder supports direct connection to a low-voltage distribution board. The cables or Cu strips are connected using the bolts supplied with the feeders.

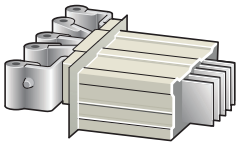


Figure 3-8 Distribution board feeder

160...250 A	BD2.-250-VE
160...400 A	BD2.-400-VE
630 ... 1000 A	BD2.-1000-VE
630...1250 A	BD2C-1250-VE

3.2.7 Coupling units

Features of coupling units

Coupling units are used if devices or sections of the power supply need to be disconnected or connected accordingly. To adapt the busbar trunking system to the actual load, the busbar cross section can be reduced and protected against short circuits and overloads with a coupling unit.

Coupling units can be fitted with load disconnect switches up to 630 A or circuit-breakers up to 1250 A as appropriate for the application concerned.

The maximum installation length in the busbar trunking run is 1500 mm. The dimensions of the coupling unit must not exceed 1250 x 500 x 500 mm (W x H x D).

Coupling units with circuit-breaker

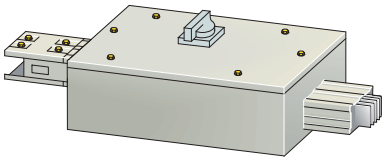


Figure 3-9 Coupling unit with circuit-breaker

BD2.-...-K...-3VL...: On request

Coupling units with fuse switch disconnector

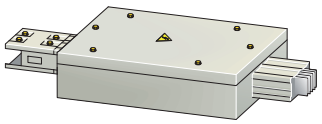


Figure 3-10 Coupling unit with fuse switch disconnector

BD2.-...-K...-ST...: On request

3.2.8 Tap-off units

Tap-off units are used to supply power to loads and outgoing current feeders, e.g. for incoming power supplies to smaller busbar trunking systems.

3.2.8.1 Tap-off units up to 25 A

Special features

- Tap-off units with fuses, miniature circuit-breakers and sockets
- Insulation-enclosed, light grey in colour RAL 7035
- Transparent cover which can be operated from the outside for the protective devices
- Load switching capacity AC 22 B (400 V) of tap contacts
- Multi-core cables can be fed in from three sides
- Knockouts
- Cable sleeve and integrated strain relief (standard)
- The tap-off unit must be disassembled in order to open the unit and connect the cables.
- Anti-rotation feature prevents incorrect mounting.
- See technical data for conductor cross sections.

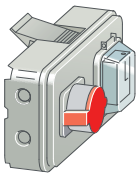


Figure 3-11 Tap-off units up to 25 A

I_e A	U_e V	Design	Type
25	400	Fuse base 3 x D02	BD2-AK1/S18
16	400	Fuse base 3 x D01	BD2-AK1/S14
16	400	3-pole miniature circuit-breaker 16 A, characteristic C	BD2-AK1/A163
16	230	Fuse base 2 x D01 and 2 x 3-pole sockets CEE 16	BD2-AK1/2CEE163S14
16	400	Fuse base 3 x D01 and 1 x 5-pole socket CEE 16	BD2-AK1/CEE165S14
16	230	2 x 16 A miniature circuit-breakers, 1-pole, characteristic B and 2 sockets CEE 16, 3-pole	BD2-AK1/2CEE163A161
16	400	3-pole 16 A miniature circuit-breaker, characteristic C and 1 socket CEE 16, 5-pole	BD2-AK1/CEE165A163
16	230	Fuse base 3 x D01 and 3 x 16 A socket outlets with earthing contact	BD2-AK1/3SD163S14
16	230	3 x 16 A miniature circuit-breakers, 1-pole, characteristic B and 3 x 16 A socket outlets with earthing contact	BD2-AK1/3SD163A161

3.2.8.2 Tap-off units up to 63 A

Tap-off units with 63 A, with cover integrated load disconnector

Special features

- Tap-off units with fuses, miniature circuit-breakers and sockets
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey in colour, RAL 7035
- The cover has to be opened prior to mounting and removing the unit
- Multi-core cables can be fed in from three sides, knockouts
- Anti-rotation feature prevents incorrect mounting.
- Switch disconnector integrated into cover, switching capacity AC 22 B (400 V) ensures zero voltage and zero load when the cover is opened
- See technical data for conductor cross sections.

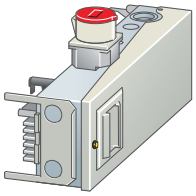


Figure 3-12 Tap-off units up to 63 A, with cover integrated load disconnector

I_e	U_e	Design	Type
A	V		
63	400	3-pole fuse base D02 up to 63 A	BD2-AK2X/S18
25	500	3-pole fuse base S27 up to 25 A	BD2-AK2X/S27
63	500	3-pole fuse base S33 up to 63 A	BD2-AK2X/S33
32	400	3-pole miniature circuit-breaker 32 A, characteristic C	BD2-AK2M2/A323
32	400	3-pole fuse base S33 and 1 x 5-pole socket CEE 32	BD2-AK2X/CEE325S33
63	400	3-pole fuse base S33 and 1 x 5-pole socket CEE 63	BD2-AK2X/CEE635S33
32	400	3-pole 32 A miniature circuit-breaker, characteristic C and 1 x 5-pole socket CEE 32	BD2-AK2M2/CEE325A323
16	400	2 x 3-pole fuse bases D01 and 2 x 5-pole sockets CEE 16	BD2-AK2X/2CEE165S14
16	400	2 x 3-pole 16 A miniature circuit-breakers, characteristic C and 2 x 5-pole sockets CEE 16	BD2-AK2M2/2CEE165A163
16	230	1 x 3-pole miniature circuit-breaker 16 A, characteristic C and 2 x 1-pole miniature circuit-breaker 16 A, characteristic C and 1 x 5-pole socket CEE 16 and 2 x 16 A sockets with earthing contact	BD2-AK2M2/2SD163CEE165A163

Tap-off units up to 63 A, without cover integrated load disconnector

Special features

- Tap-off units with fuses or miniature circuit-breakers
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey in colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- The unit can be mounted and removed with the cover open and closed
- If the cover is open, the installed devices will remain live (test option). IP20 protection/finger safety is assured.
- Multi-core cables can be fed in from three sides via knockouts
- See technical data for conductor cross sections.

Note

You are not permitted to connect or disconnect the tap-off unit under load.

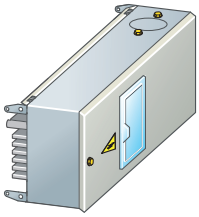


Figure 3-13 Tap-off units up to 63 A, without cover integrated load disconnector

I_e	U_e	Design	Type
A	V		
63	400	3-pole fuse base D02 up to 63 A	BD2-AK02X/S18
25	500	3-pole fuse base S27 up to 25 A	BD2-AK02X/S27
63	500	3-pole fuse base S33 up to 63 A	BD2-AK02X/S33
25	400	3-pole fuse base SP38 for cylindrical fuse-link 10 x 38 mm	BD2-AK02X/F1038-3
25	400	4-pole fuse base SP38 for cylindrical fuse-link 10 x 38 mm	BD2-AK02X/F1038-3N
32	400	3-pole fuse base SP51 for cylindrical fuse-link 14 x 51 mm	BD2-AK02X/F1451-3
32	400	4-pole fuse base SP51 for cylindrical fuse-link 14 x 51 mm	BD2-AK02X/F1451-3N
63	400	3-pole fuse base SP58 for cylindrical fuse-link 22 x 58 mm	BD2-AK02X/F2258-3
63	400	4-pole fuse base SP58 for cylindrical fuse-link 22 x 58 mm	BD2-AK02X/F2258-3N
32	400	3-pole miniature circuit-breaker 32 A, characteristic C	BD2-AK02M2/A323
32	400	3+N-pole miniature circuit-breaker 32 A, characteristic C	BD2-AK02M2/A323N
63	400	3-pole miniature circuit-breaker 63 A, characteristic C	BD2-AK02M2/A633
63	400	3+N-pole miniature circuit-breaker 63 A, characteristic C	BD2-AK02M2/A633N

3.2.8.3 Tap-off units up to 125 A

Tap-off units up to 125 A, with cover integrated load disconnector

Special features

- With fuse base and fuse switch disconnector
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey in colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- Cover interlock for circuit breaker and fuse switch disconnector
- Multi-core cables can be fed in from three sides via knockouts
- See technical data for conductor cross sections.

Note

If you are using fuse bases, you must disconnect the load prior to removing the enclosure cover.

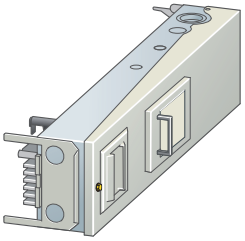


Figure 3-14 Tap-off units up to 125 A, with cover integrated load disconnector

I_e	U_e	Design	Type
A	V		
125	690	3-pole LV HRC fuse base size 00	BD2-AK3X/GS00
125	690	3-pole LV HRC fuse switch disconnector size 00	BD2-AK3X/GSTZ00

Tap-off units up to 125 A, without cover integrated load disconnector

Special features

- With miniature circuit breaker, circuit breaker, fuse switch, fuse base and fuse switch disconnector
- Sheet-steel enclosure, hot-dip galvanised and cover with powdered paint finish, light grey in colour, RAL 7035
- Anti-rotation feature prevents incorrect mounting.
- The unit can be mounted and removed with the cover open and closed

- If the cover is open, the installed devices will remain live (test option). IP20 protection/finger safety is assured.
- Cover interlock on units with circuit breaker and fuse switch disconnector
- Multi-core cables can be fed in from three sides via knockouts
- See technical data for conductor cross sections.

Note

You are not permitted to connect or disconnect the tap-off units under load.

Please be aware of the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

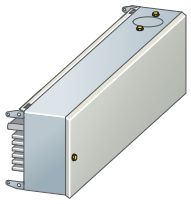


Figure 3-15 Tap-off unit up to 125 A, without cover integrated load disconnector

I_e	U_e	Design	Type
A	V		
125	400	with 3-pole miniature circuit breaker 125 A, characteristic C	BD2-AK03M2/A1253
125	400	with 3-N-pole miniature circuit breaker 125 A, characteristic C	BD2-AK03M2/A1253N
125	400	with 3-pole fuse switch disconnector GSTA00	BD2-AK03X/GSTA00
125	400	with 3-pole fuse base SP58	BD2-AK03X/F2258-3
125	400	with 4-pole fuse base SP58	BD2-AK03X/F2258-3N
125	400	with 3-pole IEC - with fuse switch disconnector	BD2-AK03X/FS125IEC-3
125	400	with 3-pole BS - with fuse switch disconnector	BD2-AK03X/FS125BS-3
125	400	with 4-pole IEC - with fuse switch disconnector	BD2-AK03X/FS125IEC-4
125	400	with 4-pole BS - with fuse switch disconnector	BD2-AK03X/FS125BS-4
40	400	with 40 A 3-pole circuit breaker	BD2-AK03X/LSD-DC40-N
63	400	with 63 A 3-pole circuit breaker	BD2-AK03X/LSD-DC(AE)63-N
80	400	with 80 A 3-pole circuit breaker	BD2-AK03X/LSD-DC(AE)80-N
100	400	with 100 A 3-pole circuit breaker	BD2-AK03X/LSD-DC100-N
125	400	with 125 A 3-pole circuit breaker	BD2-AK03X/LSD-DC125-N
40	400	with 40 A 4-pole circuit breaker	BD2-AK03X/LSD-EM40-N
63	400	with 63 A 4-pole circuit breaker	BD2-AK03X/LSD-EM63-N
80	400	with 80 A 4-pole circuit breaker	BD2-AK03X/LSD-EM80-N
100	400	with 100 A 4-pole circuit breaker	BD2-AK03X/LSD-EM100-N
125	400	with 125 A 4-pole circuit breaker	BD2-AK03X/LSD-EM125-N

3.2.8.4 Tap-off units up to 250 A

Special features

- Tap-off units with circuit breaker, fuse switch disconnector and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted, light grey in colour, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- See technical data for conductor cross sections.

Note

Please be aware of the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.
You are not permitted to connect or disconnect the tap-off unit under load.

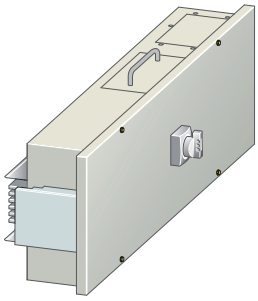


Figure 3-16 Tap-off units up to 250 A

I_e	U_e	Design	Type
A	V		
160	400	with 160 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-160-N
160	400	with 160 A 4-pole circuit breaker	BD2-AK04/LSD-EC-160-N
200	400	with 200 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-200-N
200	400	with 200 A 4-pole circuit breaker	BD2-AK04/LSD-EC-160-N
250	400	with 250 A 3-pole circuit breaker	BD2-AK04/LSD-DC(AE)-250-N
250	400	with 250 A 4-pole circuit breaker	BD2-AK04/LSD-EC-250-N
225	400	with 250 A 3-pole fuse switch disconnector	BD2-AK04/FS250IEC(BS)-3
225	400	with 250 A 4-pole fuse switch disconnector	BD2-AK04/FS250IEC(BS)-4
250	690	with 3-pole NH1 fuse base	BD2-AK04/SNH1

3.2.8.5 Tap-off units up to 400 A

Tap-off units up to 400 A, for BD2 systems 630 to 1250 A only

Special features

- Tap-off units with circuit breaker, fuse switch disconnector and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted, light grey in colour, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- See technical data for conductor cross sections.

Note

Please be aware of the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

You are not permitted to connect or disconnect the tap-off unit under load.

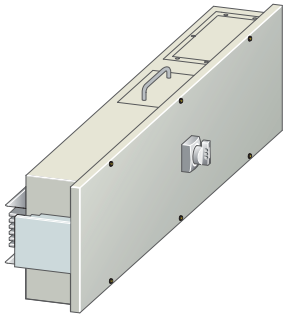


Figure 3-17 Tap-off units up to 400 A, for BD2 systems 630 to 1250 A only

I_e	U_e	Design	Type
A	V		
400	400	with 400 A 3-pole circuit breaker	BD2-AK05/LSD-DC(AE)-400-N
400	400	with 400 A 4-pole circuit breaker	BD2-AK05/LSD-EC-400-N
320	400	with 400 A 3-pole fuse switch disconnector	BD2-AK05/FS400IEC(BS)-3
320	400	with 400 A 4-pole fuse switch disconnector	BD2-AK05/FS400IEC(BS)-4
400	690	with 3-pole NH2 fuse base	BD2-AK05/SNH2

3.2.8.6 Tap-off units up to 530 A

Tap-off units up to 530 A, for BD2 systems 630 to 1250 A only

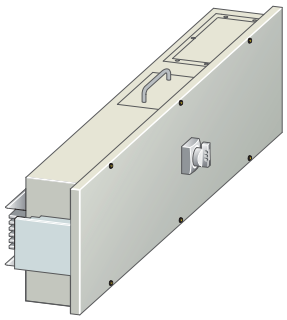
Special features

- Tap-off units with circuit breaker and fuse base
- Sheet-steel enclosure, hot-dip galvanised and painted,
- light grey in colour, RAL 7035
- Multi-core or single-core cables can be fed in from 3 sides
- The cover has to be opened prior to mounting and removing the unit
- Anti-rotation feature prevents incorrect mounting.
- See technical data for conductor cross sections.

Note

Please be aware of the reduced switching capacity when using the tap-off units with circuit breakers at U_e = 690 V.

You are not permitted to connect or disconnect the tap-off unit under load.



Tap-off units up to 530 A, for BD2 systems 630 to 1250 A only

I_e	U_e	Design	Type
A	V		
530	400	with 630 A 3-pole circuit breaker	BD2-AK06/LSD-DC(AE)-630-N
530	400	with 630 A 4-pole circuit breaker	BD2-AK06/LSD-EC-630-N
530	690	with 3-pole NH3 fuse base	BD2-AK06/SNH3

3.2.9 Ancillary equipment units

Special features

- The enclosure is made of hot-dip galvanised sheet steel and has a painted cover. It is light grey in colour (RAL 7035).
- Cables can be inserted from 3 sides via knockouts (plastic cable glands with strain relief must be used, these are not included in the scope of supply).
- Can be combined with tap-off units (BD2-AK02, AK2, AK03, AK3)
- A standard rail is integrated for installation of the device.
- 1 size with 8 WM (1 WM = 18 mm space requirement).
- With or without component mounting unit for external actuation (1 size with with space units for 8 WM)
- Installation of devices (e.g. circuit-breakers) according to DIN 43871 up to and including 63 A is possible.

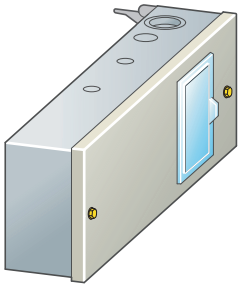


Figure 3-18 Ancillary equipment unit

Ue V	Design	Type
400		BD2-GK2X/F
400		BD2-GKM2/F

3.2.10 Additional equipment

3.2.10.1 Additional equipment for increased degree of protection IP54 and IP55

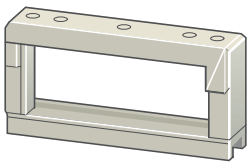
Flange for increased degree of protection

In both the horizontal and vertical mounting positions, the BD2 busbar trunking system has IP52 degree of protection. This can be increased to IP54 or IP55 by fitting additional flanges.

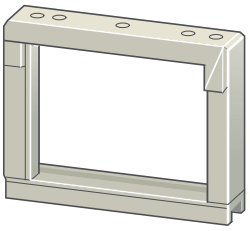
Detailed information about degree of protection flanges appears in the LV 70 catalogue.

3.2.10.2 Fixing accessories

The following fixing brackets are available for edgewise and flat mounting of busbar trunking systems in horizontal busbar trunking runs:



Fixing bracket BD2-400-BB



Fixing bracket BD2-1250-BB

Fixing accessories

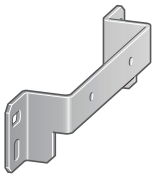
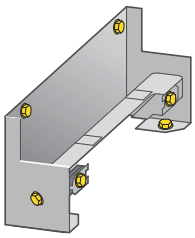


Figure 3-19 Fixing bracket for vertical mounting BD2-BVF

For the fixing of vertical busbar trunking runs



Wall fixing BD2-BWV

Wall fixing BD2-BVC

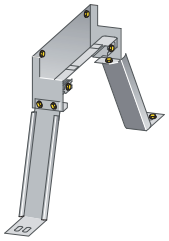


Figure 3-20 Ceiling fixing BD2-BDV

Compensation of wall or ceiling unevenness between 30 and 82 mm

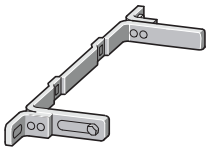


Figure 3-21 Spacer bracket BD2-BDV

The spacer bracket is combined with the BD2-400(1250)-BB fixing bracket.

3.3 Technical data

3.3.1 BD2 general data

Type			BD2-...
Standards and regulations			DIN EN 60439-1 and -2
Rated insulation voltage U_i		VAC/VDC	690 / 800
Overvoltage category/pollution degree			III / 3
Rated operating voltage U_e		V AC	690
Frequency		Hz	50 ... 60 [1]
Rated operational current I_e			
• Aluminium bars		A	160 ... 1000
• Copper bars		A	160 ... 1250
Resist-ance to extreme climates	Damp heat, constant, to IEC 60068-2-78		40 °C / 93% / RH / 56d
	Damp heat, cyclic, to IEC 60068-2-30		56 x (25 ... 40°C/3 h ; 40°C/9 h; 40-25°C/3-6 h ; 25 °C/6 h) / 95% RH
	Cold in accordance with IEC 60068-2-1		-45 °C, 16 h
	Temperature change in accordance with IEC 60068-2-14		-45 ° to 55 °C; 5 cycles (1 °C/min); Holding time min. 30 min
	Salt spray test in accordance with IEC 60068-2-52		Degree of severity 3
Environmental classes			1K5, 3K7L, 2K2, 1C2, 2C2, 3C2, 1B2, 2B2, 3B2, 1S2, 2S2, 3S2
Ambient temperature min./max./24-hour average		°C	–5 / +40 / +35
Degree of protection compliant with IEC/EN 60529 (type 2)			
• Trunking units			IP52
• Trunking units with additional equipment on busbar trunking run			IP54, IP55
• Feeder units			IP55
• Tap-off units			IP54
• Tap-off units with additional equipment			IP55
• Distribution board feeders			IP00
Trunking units			Hot-dip galvanised, painted sheet steel, light-grey (RAL 7035)
Feeder units, tap-off units			Enclosure of hot-dip galvanised sheet steel, cover painted, colour light-grey, RAL 7035
• Exception: Tap-off units BD2-AK1/...			Moulded-plastic enclosure, light grey (RAL 7035)
• Busbars			
Aluminium/copper			Nickel-plated and tinned bars
Mounting position			Edgewise, flat, vertical

[1] In accordance with EN60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

3.3.2 Tap-off units

Type	BD2-AK2..., BD2-AK3...				
Rated current I_e	**25 A**	**63 A**	**125 A**	**250 A**	**400 A**
Switching capacity of the contact mechanism	AC-22B	–	–	–	–
Switching capacity of the built-in switch disconnector acc. to DIN EN 60947-3 at 400 V	–	AC-22B	AC-21B	–	–

Important planning guideline

It is not the case that every tap-off unit has a rated voltage of 690 V and a short-circuit rating in accordance with the system size.

The tap-off units used must be compatible with the values required by the equipment as far as their short-circuit rating and rated voltage are concerned.

If the tap-off unit is not compatible with the rated voltage, a unit with appropriate internal components must be selected. Higher short-circuit currents must be limited by means of upstream protection devices (e.g. circuit breakers).

3.3.3 Trunking units BD2A (aluminium)

Type			BD2A-.-160	BD2A-.-250	BD2A-.-400
Conducting paths					
Rated insulation voltage U_i		VAC/VDC	690/800	690/800	690/800
Overvoltage category/pollution degree			III/3	III/3	III/3
Rated operating voltage U_e		V AC	690	690	690
Frequency		Hz	50...60	50...60	50...60
Rated current I_e = therm. rated current at max. 40°C and 35°C average over 24 hours		A	160	250	400
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)					
• Resistance	R_{20}	mΩ/m	0.484	0.302	0.167
• Reactance	X_{20}	mΩ/m	0.162	0.131	0.123
• Impedance	Z_{20}	mΩ/m	0.511	0.330	0.207
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)					
• Resistance	R_1	mΩ/m	0.588	0.375	0.215
• Reactance	X_1	mΩ/m	0.160	0.128	0.122
• Impedance	Z_1	mΩ/m	0.610	0.397	0.247

Type				BD2A-.-160	BD2A-.-250	BD2A-.-400
Impedance of conducting paths under fault conditions						
• AC current rating		R_F	mΩ/m	0.959	0.673	0.548
• Reactance		X_F	mΩ/m	0.681	0.487	0.456
• Impedance		Z_F	mΩ/m	1.159	0.831	0.713
Zero impedance acc. to DIN EN 60909-0/VDE 0102	Phase N	R_0	mΩ/m	2.050	1.340	1.217
		X_0	mΩ/m	0.884	0.750	0.640
		Z_0	mΩ/m	2.232	1.535	1.375
	Phase PE	R_0	mΩ/m	2.018	1.071	1.059
		X_0	mΩ/m	0.416	0.567	0.518
		Z_0	mΩ/m	2.061	1.212	1.179
Short-circuit rating						
• Rated peak withstand current I_{pk}			kA	17	32	40
• Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	10	16	20
Number of conductors				5	5	5
Conductor cross section		L1, L2, L3	mm^2	63	108	205
		N	mm^2	63	108	205
		PE	mm^2	63	108	205
		1/2 PE	mm^2	63	108	205
Conductor material				Al	Al	Al
Max. fixing distances for trunking units under conventional mechanical load						
• Edgewise			m	4	4	4
• Edgewise with BD2-BD [1]			m	4	4	4
• Flat			m	3.5	3.5	3.5
Fire load [2]			kWh/m	1.32	1.32	1.32
Weight [3]			kg/m	5.3	5.8	7.5

[1] When using spacer brackets BD2-BD

[2] Values for trunking units with tap-off points

[3] Weights without joint block (weight of joint block BD2-400-SK: 3.5 kg, BD2-1250-EK: 6.5 kg)

Type				BD2A-.-630	BD2A-.-800	BD2A-.-1000
Conducting paths						
Rated insulation voltage U_i			VAC/VDC	690/800	690/800	690/800
Overvoltage category/pollution degree				III/3	III/3	III/3
Rated operating voltage U_e			V AC	690	690	690
Frequency			Hz	50...60	50...60	50...60 [1]
Rated current I_e = therm. rated current at max. 40°C and 35°C average over 24 hours			A	630	800	1000
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)						
• Resistance		R_{20}	mΩ/m	0.073	0.073	0.051
• Reactance		X_{20}	mΩ/m	0.058	0.058	0.058
• Impedance		Z_{20}	mΩ/m	0.093	0.093	0.077
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)						
• Resistance		R_1	mΩ/m	0.091	0.098	0.066
• Reactance		X_1	mΩ/m	0.057	0.057	0.057
• Impedance		Z_1	mΩ/m	0.107	0.114	0.088
Impedance of conducting paths under fault conditions						
• AC current rating		R_F	mΩ/m	0.225	0.225	0.157
• Reactance		X_F	mΩ/m	0.239	0.239	0.240
• Impedance		Z_F	mΩ/m	0.328	0.328	0.287
Zero impedance acc. to DIN EN 60909-0/VDE 0102	Phase N	R_0	mΩ/m	0.494	0.494	0.340
		X_0	mΩ/m	0.312	0.312	0.301
		Z_0	mΩ/m	0.584	0.584	0.454
	Phase PE	R_0	mΩ/m	0.438	0.438	0.408
		X_0	mΩ/m	0.280	0.280	0.273
		Z_0	mΩ/m	0.520	0.520	0.491
Short-circuit rating						
• Rated peak withstand current I_{pk}			kA	64	84	90
• Rated short-time withstand current I_{cw}		t = 1 s	kA	26	32	34
		t = 0.1 s	kA	32	40	43
Number of conductors				5	5	5
Conductor cross section		L1, L2, L3	mm^2	446	446	699
		N	mm^2	446	446	699
		PE	mm^2	446	446	699
		1/2 PE	mm^2	446	446	446
Conductor material				Al	Al	Al

Type		BD2A-.-630	BD2A-.-800	BD2A-.-1000
Max. fixing distances for trunking units under conventional mechanical load				
• Edgewise	m	4	3.5	3
• Edgewise with BD2-BD [2)]	m	2	1.75	1.5
• Flat	m	3.5	3	2.5
Fire load [3)]	kWh/m	2	2	2
Weight [4)]	kg/m	12.3	12.4	15.8

1) In accordance with EN60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

2) When using spacer brackets BD2-BD

3) Values for trunking units with tap-off points

4) Weights without joint block (weight of joint block BD2-400-SK: 3.5 kg, BD2-1250-EK 6.5 kg)

3.3.4 Trunking units BD2A (copper)

Type			BD2C-.-160	BD2C-.-250	BD2C-.-400
Conducting paths					
Rated insulation voltage U_i		VAC/VDC	690/800	690/800	690/800
Overvoltage category/pollution degree			III/3	III/3	III/3
Rated operating voltage U_e		V AC	690	690	690
Frequency		Hz	50...60	50...60	50...60
Rated current I_e = therm. rated current at max. 40°C and 35°C average over 24 hours		A	160	250	400
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)					
• Resistance	R_{20}	mΩ/m	0.303	0.295	0.144
• Reactance	X_{20}	mΩ/m	0.157	0.158	0.119
• Impedance	Z_{20}	mΩ/m	0.341	0.335	0.187
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)					
• Resistance	R_1	mΩ/m	0.333	0.383	0.181
• Reactance	X_1	mΩ/m	0.157	0.159	0.120
• Impedance	Z_1	mΩ/m	0.368	0.419	0.217

Type				BD2C-.-160	BD2C-.-250	BD2C-.-400
Impedance of conducting paths under fault conditions						
• AC current rating		R_F	mΩ/m	0.666	0.674	0.364
• Reactance		X_F	mΩ/m	0.511	0.530	0.461
• Impedance		Z_F	mΩ/m	0.839	0.858	0.587
Zero impedance acc. to DIN EN 60909-0/VDE 0102	Phase N	R_0	mΩ/m	1.419	1.429	0.718
		X_0	mΩ/m	0.691	0.703	0.658
		Z_0	mΩ/m	1.579	1.593	0.974
	Phase PE	R_0	mΩ/m	1.027	1.139	0.672
		X_0	mΩ/m	0.641	0.530	0.503
		Z_0	mΩ/m	1.211	1.256	0.839
Short-circuit rating						
• Rated peak withstand current I_{pk}			kA	17	32	40
• Rated short-time withstand current I_{cw}		t = 1 s	kA	5.5	10	16
		t = 0.1 s	kA	10	16	20
Number of conductors				5	5	5
Conductor cross section		L1, L2, L3	mm^2	63	63	146
		N	mm^2	63	63	146
		PE	mm^2	63	63	146
		1/2 PE	mm^2	63	63	146
Conductor material				Cu	Cu	Cu
Max. fixing distances for trunking units under conventional mechanical load						
• Edgewise			m	4	4	4
• Edgewise with BD2-BD [1]			m	4	4	4
• Flat			m	3.5	3.5	3.5
Fire load [2]			kWh/m	1.32	1.32	1.32
Weight [3]			kg/m	7.3	7.5	9.5

[1] When using spacer brackets BD2-BD

[2] Values for trunking units with tap-off points

[3] Weights without joint block (weight of joint block BD2-400-SK: 3.5 kg, BD2-1250-EK 6.5 kg)

Type				BD2C-.-630	BD2C-.-800	BD2C-.-1000	BD2C-.-1250
Conducting paths							
Rated insulation voltage U_i			VAC/VDC	690/800	690/800	690/800	690/800
Overvoltage category/pollution degree				III/3	III/3	III/3	III/3
Rated operating voltage U_e			V AC	690	690	690	690
Frequency			Hz	50...60	50...60	50...60 1)	50...60 1)
Rated current I_e = therm. rated current at max. 40°C and 35°C average over 24 hours			A	630	800	1000	1250
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with cold busbars)							
• Resistance		R_{20}	mΩ/m	0.069	0.069	0.043	0.032
• Reactance		X_{20}	mΩ/m	0.054	0.054	0.056	0.054
• Impedance		Z_{20}	mΩ/m	0.088	0.088	0.071	0.063
Impedance of conducting paths at 50 Hz and 20°C ambient temperature (with busbars at normal operating temperature)							
• Resistance		R_1	mΩ/m	0.087	0.091	0.056	0.041
• Reactance		X_1	mΩ/m	0.054	0.054	0.056	0.054
• Impedance		Z_1	mΩ/m	0.102	0.106	0.079	0.068
Impedance of conducting paths under fault conditions							
• AC current rating		R_F	mΩ/m	0.173	0.172	0.118	0.094
• Reactance		X_F	mΩ/m	0.226	0.229	0.234	0.229
• Impedance		Z_F	mΩ/m	0.285	0.286	0.262	0.248
Zero impedance acc. to DIN EN 60909-0/ VDE 0102	Phase N	R_0	mΩ/m	0.357	0.373	0.234	0.186
		X_0	mΩ/m	0.296	0.266	0.286	0.275
		Z_0	mΩ/m	0.464	0.458	0.370	0.332
	Phase PE	R_0	mΩ/m	0.342	0.334	0.230	0.174
		X_0	mΩ/m	0.283	0.284	0.278	0.265
		Z_0	mΩ/m	0.444	0.438	0.361	0.317

Type			BD2C-.-630	BD2C-.-800	BD2C-.-1000	BD2C-.-1250
Short-circuit rating						
• Rated peak withstand current I_{pk}		kA	64	84	90	90
• Rated short-time withstand current I_{cw}	t = 1 s	kA	26	32	34	34
	t = 0.1 s	kA	32	40	43	43
Number of conductors			5	5	5	5
Conductor cross section	L1, L2, L3	mm^2	280	280	468	699
	N	mm^2	280	280	468	699
	PE	mm^2	280	280	468	699
	1/2 PE	mm^2	280	280	280	468
Conductor material			Cu	Cu	Cu	Cu
Max. fixing distances for trunking units under conventional mechanical load						
• Edgewise		m	4	3.5	3	2
• Edgewise with BD2-BD [2]		m	2	1.75	1.5	1
• Flat		m	3.5	3	2.5	1.5
Fire load [3]		kWh/m	2	2	2	2
Weight [4]		kg/m	15.6	18.9	25.1	37.6

[1] In accordance with EN60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

[2] When using spacer brackets BD2-BD

[3] Values for trunking units with tap-off points

[4] Weights without joint block (weight of joint block BD2-400-SK: 3.5 kg, BD2-1250-EK 6.5 kg)

3.4 Conductor cross sections

3.4.1 Feeder units

Connection cross-sections [2)]

Design	Type	L1, L2, L3		N		PE		Size of fixing screws, bolts
		min. mm²	max. mm²	min. mm²	max. mm²	min. mm²	max. mm²	L1, L2, L3, N, PE
Feeder units with bolt connection	BD2.-250-EE	1 × 6	1 × 150, 2 × 70	1 × 6	1 × 150, 2 × 70	1 × 6	1 × 150, 2 × 70	M10
	BD2.-400-EE	1 × 10 [1)]	1 × 240, 2 × 120	1 × 10 [1)]	1 × 240, 2 × 120	1 × 10 [1)]	1 × 240, 2 × 120	M12
	BD2.-1000-EE	1 × 10 [1)]	2 × 240, 3 × 185	1 × 10 [1)]	2 × 240, 3 × 185	1 × 10 [1)]	2 × 240, 3 × 185	M12
	BD2.-1250-EE	1 × 10 [1)]	3 × 300, 4 × 240	1 × 10 [1)]	3 × 300, 4 × 240	1 × 10 [1)]	3 × 300, 4 × 240	M12
Feeder units with switch disconnector	BD2C-250(315)-EESC	1 x 10 [1)]	1 x 240	1 x 10 [1)]	1 x 240	Armouring		M10
	BD2C-400-EESC	1 x 10 [1)]	1 x 240, 2 x 120	1 x 10 [1)]	1 x 240, 2 x 120	Armouring		M12
	BD2C-630(800)-EESC	1 x 10 [1)]	2 x 240	1 x 10 [1)]	2 x 240	Armouring		M12
Centre feeder units with bolt connection	BD2.-400-ME	1 × 10 [1)]	2 × 240, 3 × 185	1 × 10 [1)]	2 × 240, 3 × 185	1 × 10 [1)]	2 × 240, 3 × 185	M12
	BD2.-1000-ME	1 × 10 [1)]	(1–5) × 300	1 × 10 [1)]	(1–5) × 300	1 × 10 [1)]	(1-5) × 300	M12

[1)] Minimum permissible cable cross section for cable lugs

[2)] Connection cross-sections refer to copper cables, cross-sections and diameters for aluminium cables on request

Cable and wire entries

Type		BD2.-250-EE	BD2.-400-EE	BD2.-1000-EE, BD2.-400-ME	BD2.-1000-ME	BD2.-1250-EE
Cable grommets for cable diameters		1 x KT3 [1)]	2 x KT4 [1)]	3 x KT4 [1)]	6 x KT4 [1)]	4 x KT4 [1)]
	mm	14...54	14...68	14...68	14...68	14...68

[1)] With strain relief

Cable entry plate single-core system (undrilled cable entry plates)

Type	BD2.-250-EE	BD2.-400-EE	BD2.-1000-EE	BD2.-1250-EE
Cable entry plate	BD2-250-EBAL	BD2-400-EBAL	BD2-1000-EBAL	BD2-1250-EBAL
No. of cable entries (maximum)	10 x M32, 5 x M40	10 x M40	15 x M40, 6 x M50 and 4 x M40	20 x M50

Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

Cable entry plate single-core system for centre feeder units (undrilled cable entry plates)

Type	BD2.-400-ME...	BD2.-1000-ME
Cable entry plate	BD2-400-MBAL	BD2-1000-MBAL
No. of cable entries (maximum)	12 x M40 and 3 x M32, 6 x M50 and 4 x M40	31 x M40, 16 x M50 and 4 x M40

Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

Cable entry plate feeder unit with switch disconnector (undrilled cable entry plates)

Type	BD2C-250(315, 400)-EESC	BD2C-630(800)-EESC
No. of cable entries (maximum)	1 x 65.7 mm	2 x 65.7 mm

3.4.2 Tap-off units

Connection cross-sections [1)]

Name	Type	L1, L2, L3		N		PE		Size of fixing screws, bolts L1, L2, L3
		min mm²	max mm²	min mm²	max mm²	min mm²	max mm²	
Up to 25 A	BD2-AK1/S14	0.5 (f, m)	4 (e)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/S18	0.5 (f, m)	16 (e, f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/A...	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/A...N	0.75 (e, m)	16 (e)	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/F...	0.75 (e, m)	16 (e)	1 (e, m)	6 (e)	1 (e, f, m)	6 (e, m)	–
	BD2-AK1/F...N	0.75 (e, m)	16 (e)	0.75 (e, m)	16 (e)	1 (e, f, m)	6 (e, m)	–
Up to 63 A	BD2-AK.2X/S18	0.5 (f, m)	25 (f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK.2X/S27	0.75 (f, m)	10 (e, f, m)	1 (e, f, m)	6 (e, m)	1 (e, f, m)	6 (e, m)	–
	BD2-AK.2X/S33	1.5 (f, m)	25 (f, m)	2.5 (e, f, m)	16 (e, m)	2.5 (e, f, m)	16 (e, m)	–
	BD2-AK.2M2/A...	0.75 (e, m)	25 (m)	2.5 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
	BD2-AK.2M2/A...N	0.75 (e, m)	25 (m)	0.75 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
	BD2-AK.2X/F...	0.75 (e, m)	25 (m)	2.5 (e, f, m)	25 (m)	2.5 (e, f, m)	25 (m)	–
	BD2-AK.2X/ GB32...	0.75 (e, m)	16 (e, m)	0.75 (e, m)	16 (e, m)	Armouring		–
	BD2-AK.2X/GB63...	0.75 (e, m)	50 (m)	0.75 (e, m)	50 (m)	Armouring		–
Up to 125 A	BD2-AK.3X/ LSD40-LSD125	2.5 (e, m)	70 (m)	2.5 (e, m)	70 (m)	2.5 (e, m)	70 (m)	–
	BD2-AK3X/GS00	16	70	16	70	10	70	M8
	BD2-AK.3X/ GSTZ(A)00	16	70	16	70	10	70	M8
	BD2-AK.3X/ GB100...	6 (e, m)	70 (m)	6 (e, m)	70 (m)	Armouring		–
	BD2-AK03X/ T(S)PNR100...	6 (e, m)	70 (m)	6 (e, m)	70 (m)	Armouring		–
Up to 250 A	BD2-AK04/SNH1	6	150	6	150	6	150	M10
	BD2-AK04/FS...	6	150	6	150	6	150	M10
	BD2-AK04/LS...	6	120 (m)	6 (e, m)	150	6	150	M8

Name	Type	L1, L2, L3		N		PE		Size of fixing screws, bolts L1, L2, L3
		min mm²	max mm²	min mm²	max mm²	min mm²	max mm²	
Up to 400 A	BD2-AK05/SNH2	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/FS...	10	2 × 120	10	2 × 120	10	2 × 120	M10
	BD2-AK05/LS...	10	2 × 120	10	2 × 120	10	2 × 120	M8
Up to 630 A	BD2-AK06/SNH3	10	2 × 240	10	2 × 240	10	2 × 240	M12
	BD2-AK06/LS...	10	2 × 240	10	2 × 240	10	2 × 240	M10

e = solid, m = stranded, f = finely-stranded with end sleeve

1) Connection cross-sections refer to copper cables, cross-sections and diameters for aluminium cables on request

Cable and wire entries

Type		BD2-AK1/...	BD2-AK.2...	BD2-AK.3...	BD2-AK04	BD2-AK05	BD2-AK06
Cable grommets		M25 2)	—	—	KT3 3)	2 × KT4 3)	2 × KT4 3)
Cable glands 1)		—	M25, M32, M40	M25, M40, M63	—	—	—
for cable diameters	mm	11 ... 6	11 ... 27	11 ... 42	14 … 54	14 … 68	14 … 68
Min./max. insertable cable cross-sections for NYY and NYCWY with multi-core cable for							
• NYY...	mm²	5 × 1,5 … 5 × 4	5 × 1,5 … 5 × 16	5 × 1,5 … 5 × 25	—	—	—
• NYCWY... 4)	mm²	4 × 1,5 … 4 × 2.5	4 × 1,5 … 4 × 16	4 × 1,5 … 4 × 70	5 × 1,5 … 4 × 150	2 × 5 × 1,5 … 2 × 4 × 150	2 × 5 × 10 … 2 × 4 × 240
Cable entry plate for single-core cable (add-on plates, undrilled)							
No. of cable entries, max.		—	—	—	10 × M40	10 × M32, 5 × M40	10 × M40

1) For cable glands: Plastic cable glands with strain relief must be used (these are not included in the scope of supply).

2) Strain relief in the BD2-AK1/...

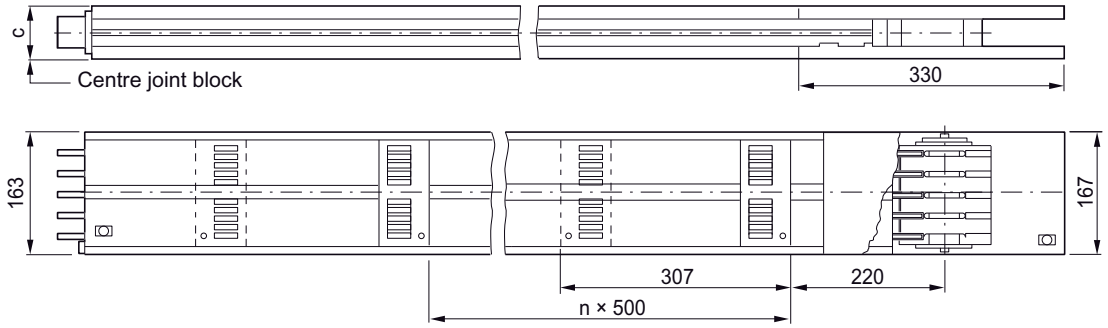
3) With strain relief

4) Fifth conductor: concentric conductor.

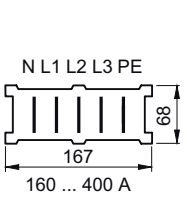
3.5 Dimension drawings

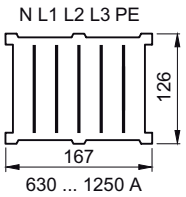
3.5.1 Straight trunking units

BD2.-.-...



Length m	No. of tap-off units on both sides n x 500
0.5 ... 1.25	-
1.26 ... 2.25	4 ... 8
2.26 ... 3.25	8 ... 12
	In the case of optional lengths, tap-off units cannot be connected at all tap-off points.





3.5.2 Junction units

L units

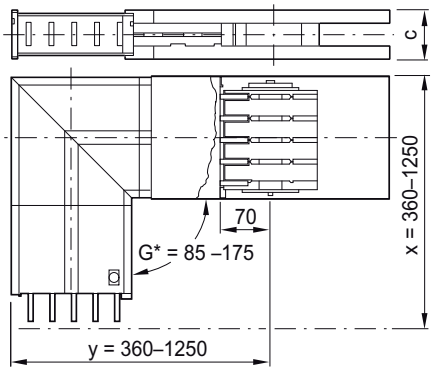


Figure 3-22 BD2.-....-LR-...(-G*), BD2.-...-LL-...(-G*)

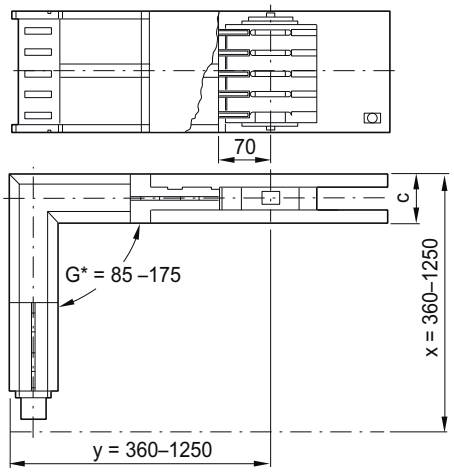


Figure 3-23 BD2.-...-LV...(-G*), BD2.-...-LH-...(-G*)

Rated current A	c mm
160 ... 400	68
630 ... 1250	126

Z units

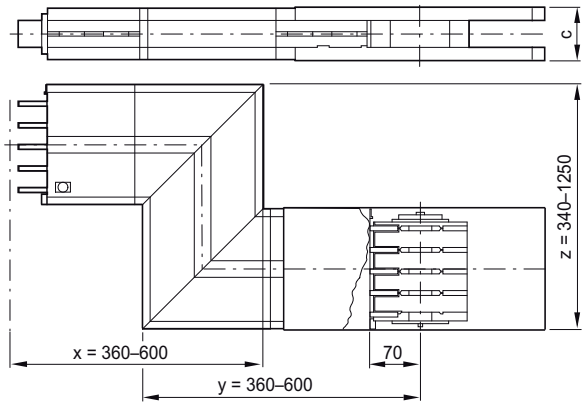


Figure 3-24 BD2.-...-ZR-..., BD2.-...-ZL-...

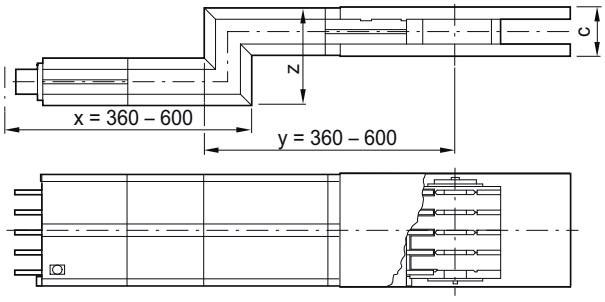


Figure 3-25 BD2.-...-ZV, BD2.-...-ZH-...

Rated current A	z mm
160 ... 400	140 ... 1250
630 ... 1250	260 ... 1250

T units

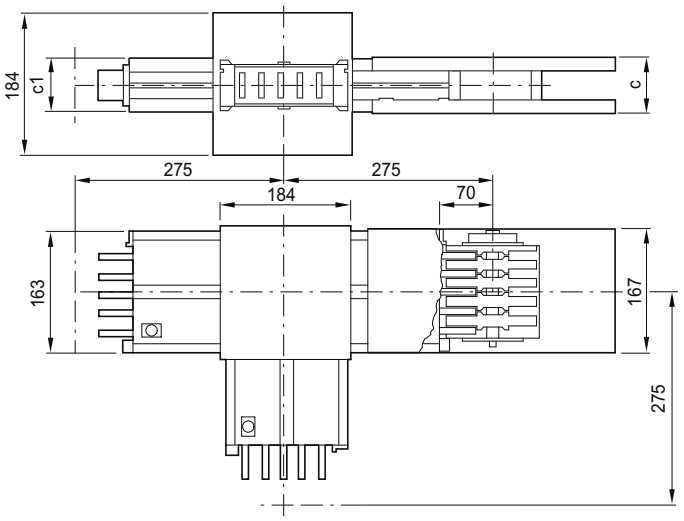


Figure 3-26 BD2.-...-TR, BD2.-...-TL

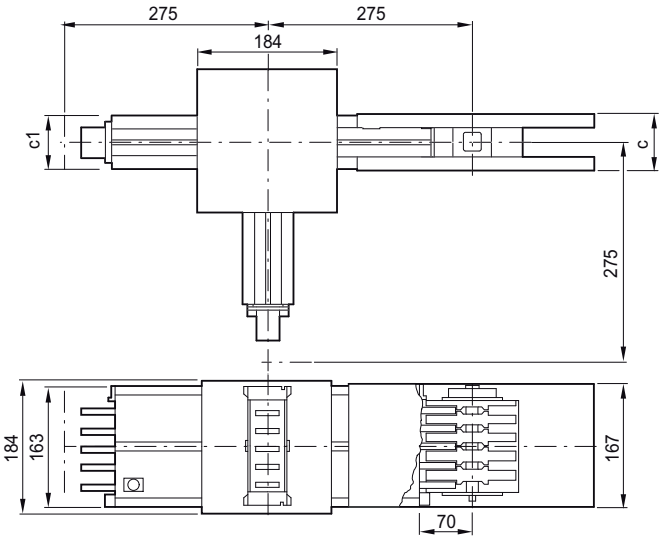


Figure 3-27 BD2.-...-TV, BD2.-...-TH

Rated current A	c mm	c1 mm
160 ... 400	68	64
630 ... 1250	126	122

K units

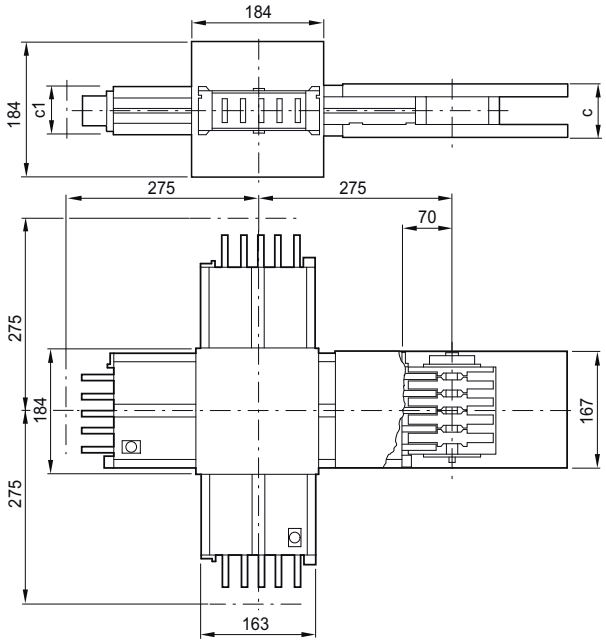


Figure 3-28 K units BD2.-...-KRL

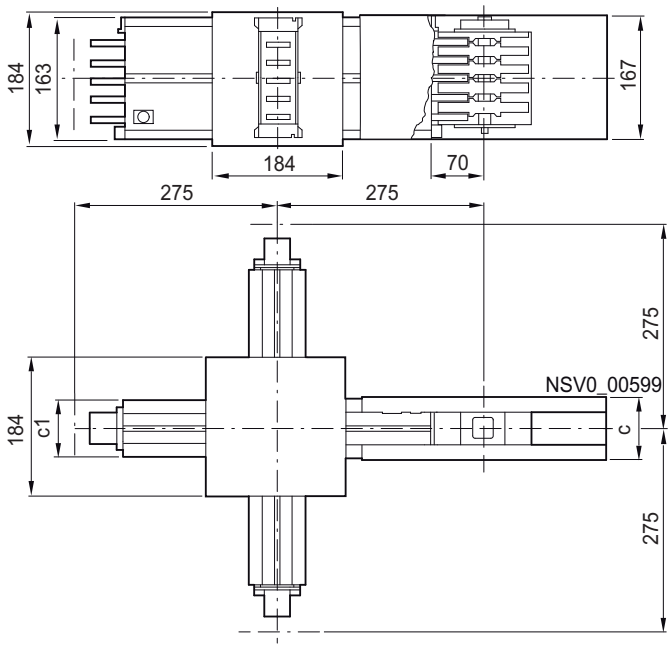


Figure 3-29 K units BD2.-...-KVH

Rated current A	c mm	c1 mm
160 ... 400	68	64
630 ... 1250	126	122

Movable junction units

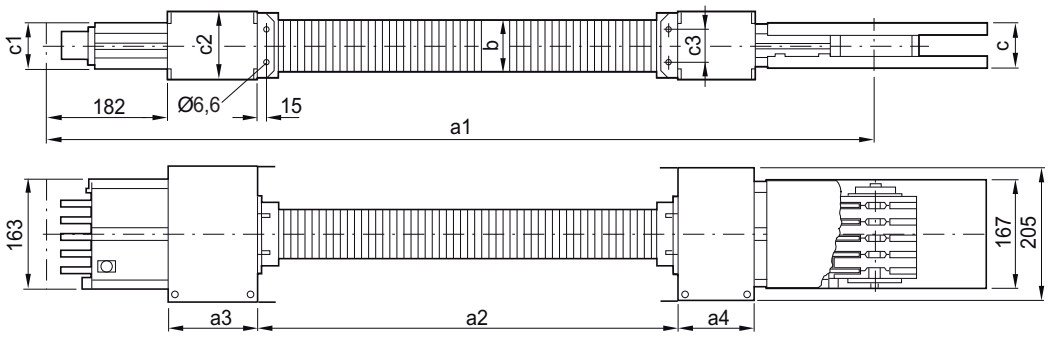
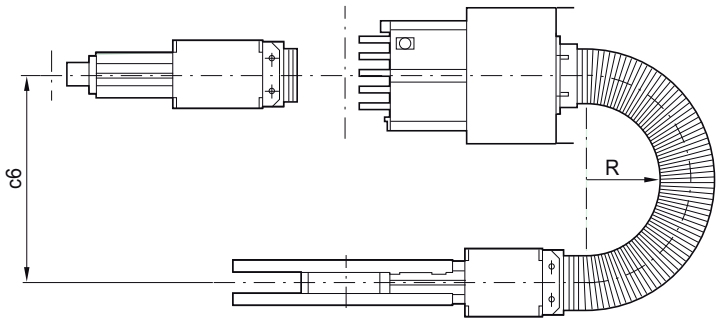


Figure 3-30 BD2-400-R, BD2-800-R

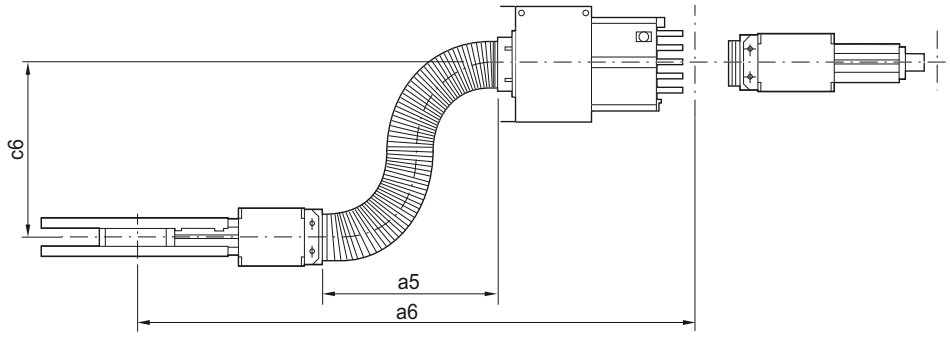
Type	a1	a2	a3	a4	b	c	c1	c2	c3
BD2-400-R	1250	512	187	187	79	68	64	101	50
BD2-800-R	1750	786	350	250	146.5	126	122	195	145

U shape



Type	c6	R_{min}
BD2-400-R	220	110
BD2-800-R	340	110

Z shape



Type	a5	a6	c6	R_{min}
BD2-400-R	175	1000	355	110
BD2-800-R	530	1590	400	110

3.5.3 Distribution board feeder

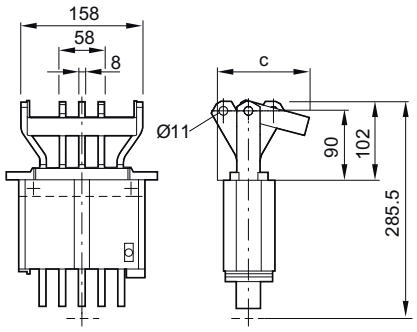


Figure 3-31 BD2.-250-VE

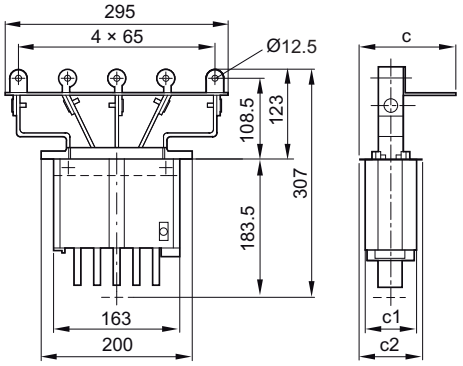


Figure 3-32 BD2.-400-VE, BD2.-1000-VE

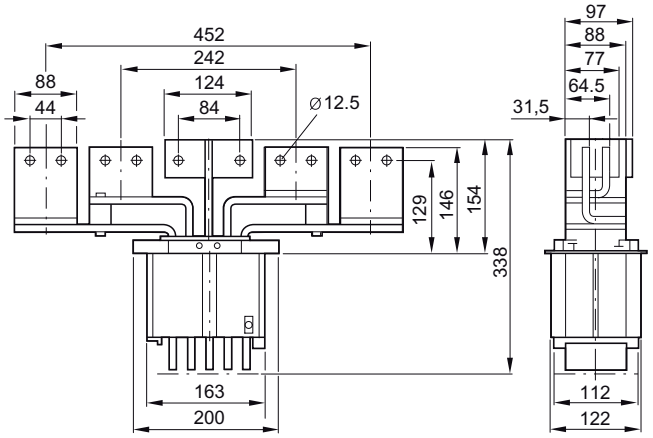
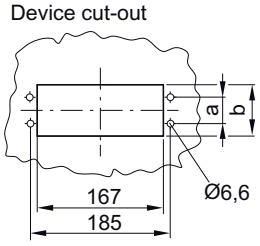


Figure 3-33 BD2.-1250-VE



Type	a	b	c	c1	c2
BD2.-250-VE BD2.-400-VE	34	68	121	64	84
BD2.-1000-VE BD2.-1250-VE	92	126	155.5	122	142

3.5.4 End feeder units

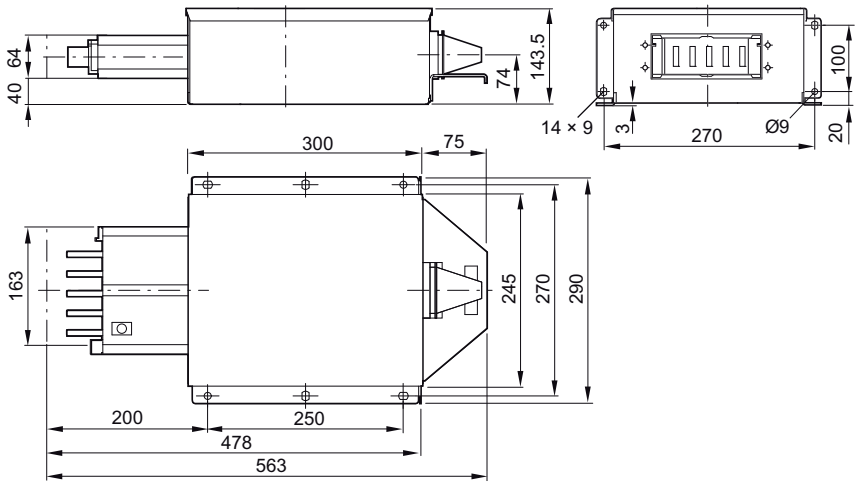


Figure 3-34 BD2.-250-EE

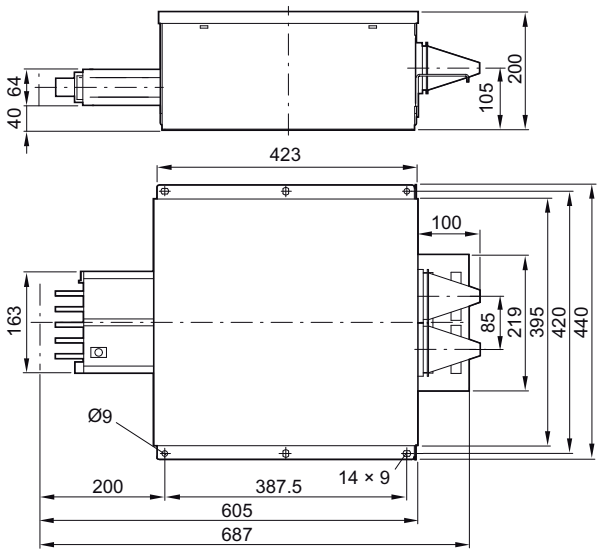


Figure 3-35 BD2.-400-EE

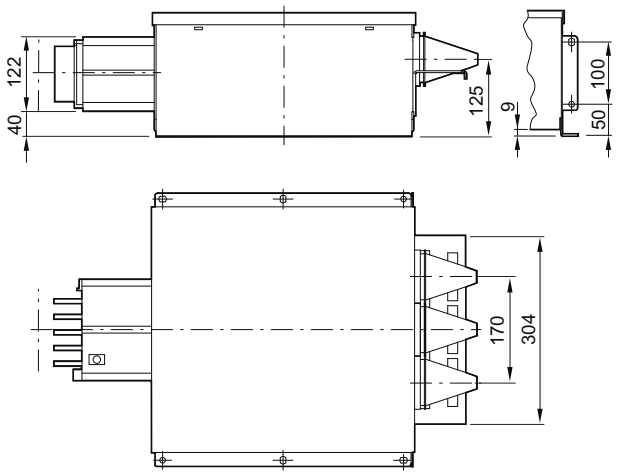


Figure 3-36 BD2.-1000-EE

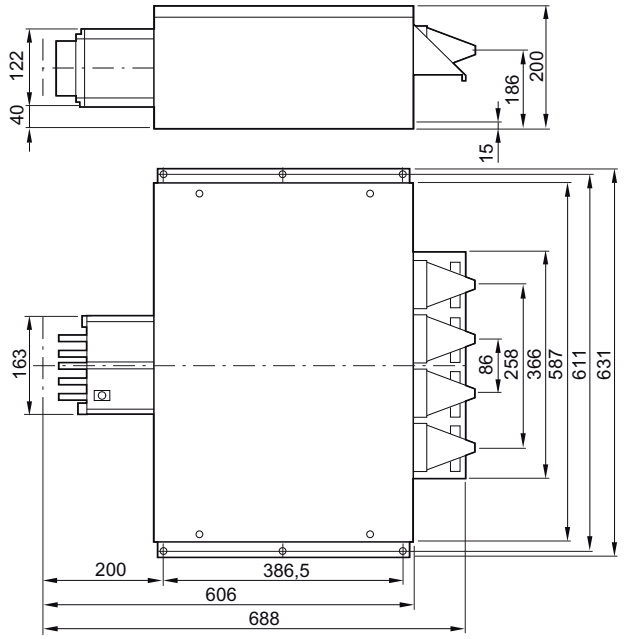


Figure 3-37 BD2.-1250-EE

End feeder units with switch disconnector

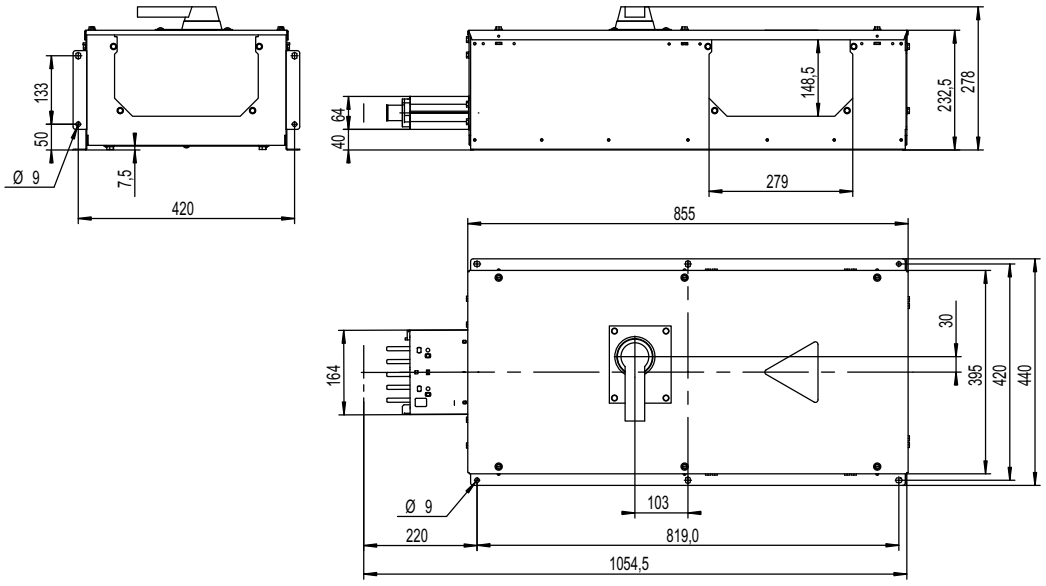


Figure 3-38 BD2C-250-EESC, BD2C-315-EESC

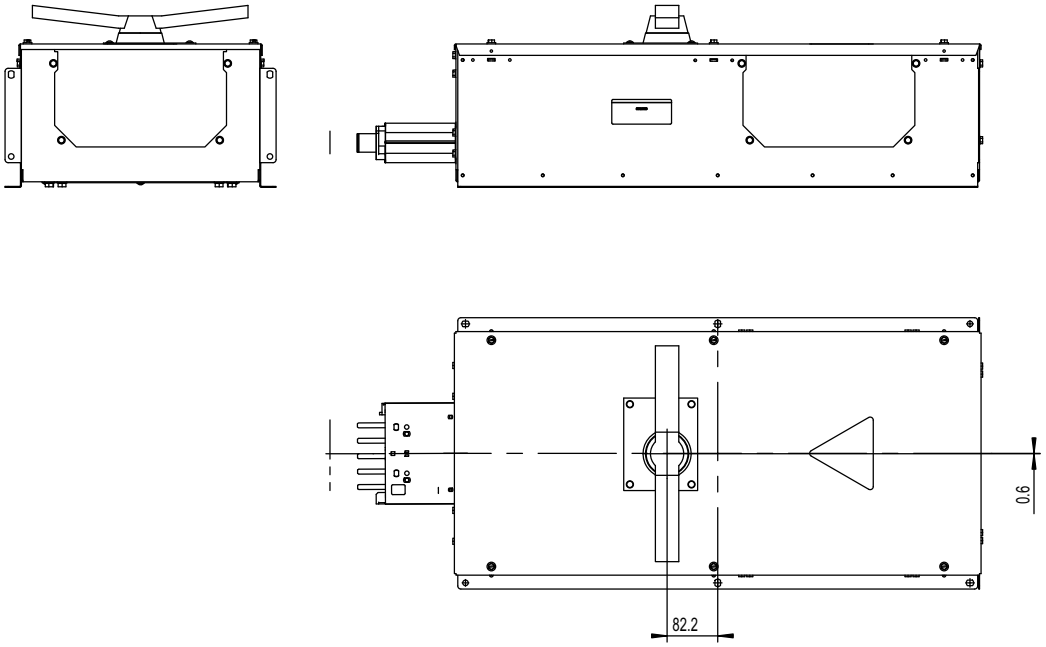


Figure 3-39 BD2-400-EESC

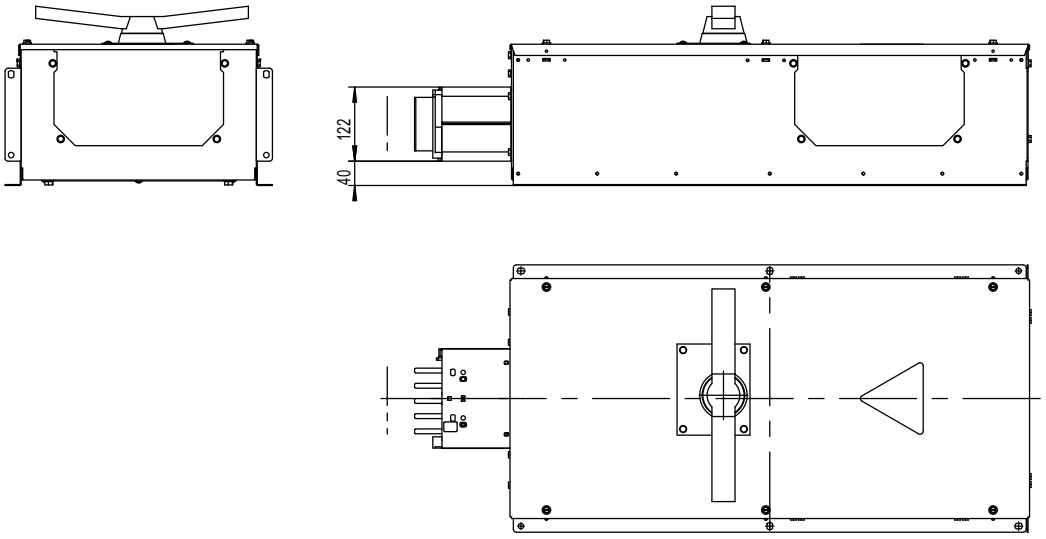


Figure 3-40 BD2-630-EESC, BD2-800-EESC

3.5.5 Cable compartments

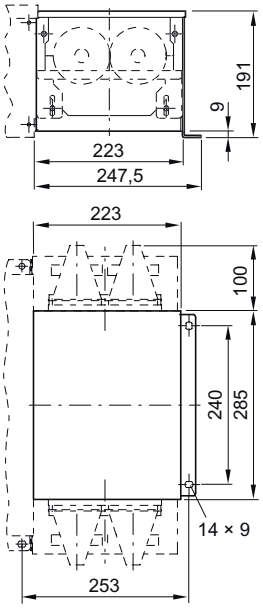


Figure 3-41 BD2-400-KR (BD2.-400-EE)

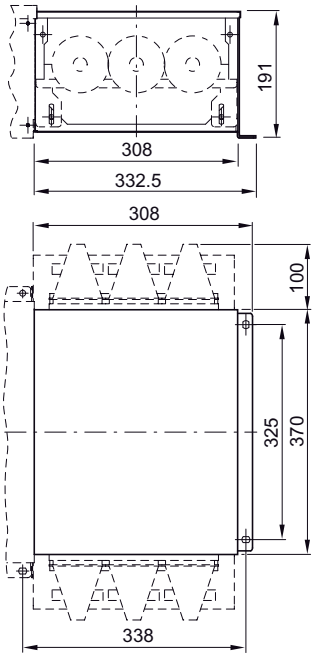


Figure 3-42 BD2-1000-KR (BD2.-1000-EE)

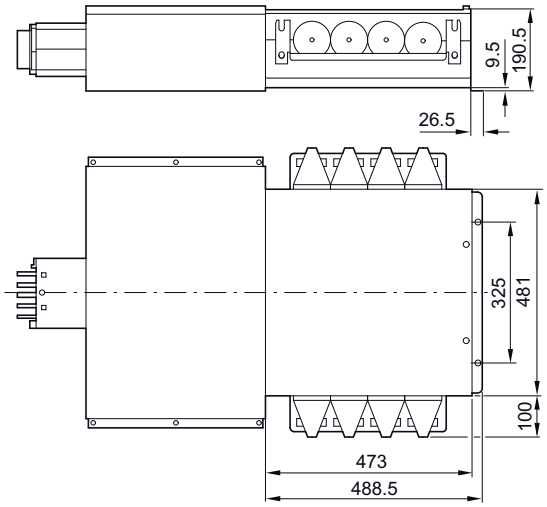


Figure 3-43 BD2-1250-KR (BD2.-1250-EE)

3.5.6 Centre feed

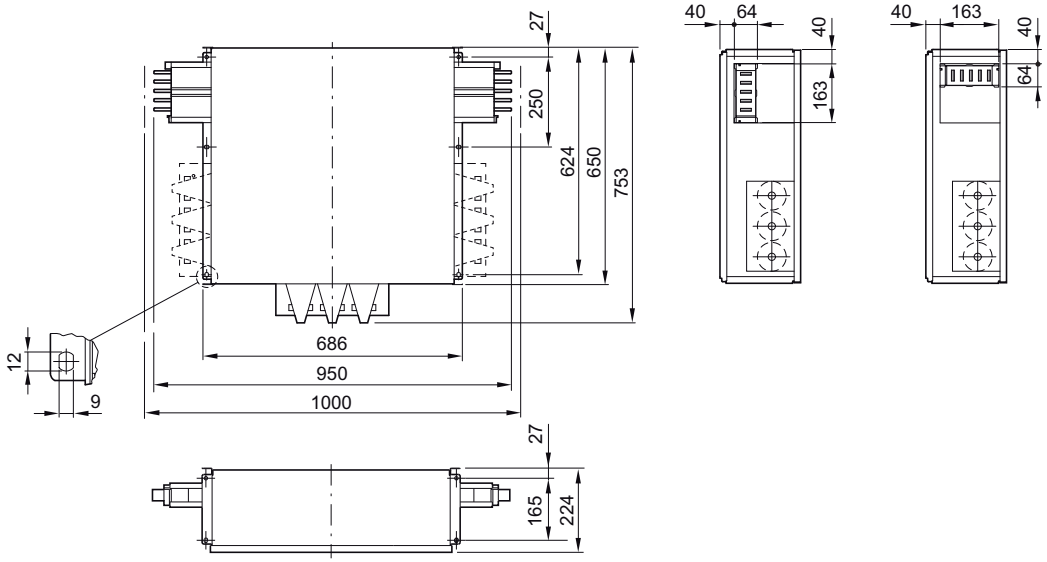


Figure 3-44 BD2.-400-ME

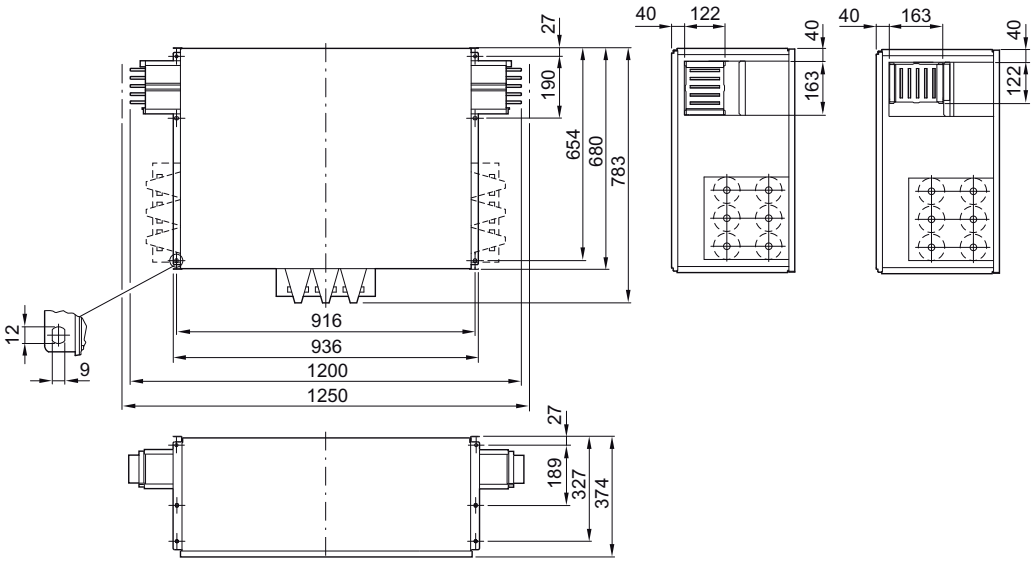


Figure 3-45 BD2.-1000-ME

3.5.7 Tap-off units

3.5.7.1 Tap-off units up to 25 A

Size 1 up to 25 A

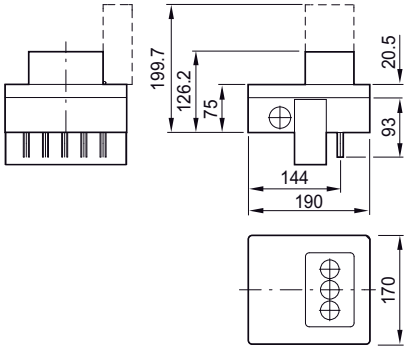


Figure 3-46 BD2-AK1/...

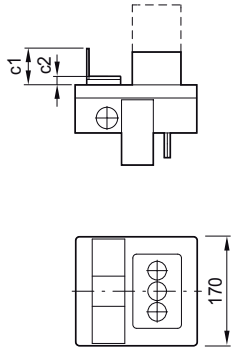


Figure 3-47 BD2-AK1/3SD163..., BD2-AK1/3DK..., BD2-AK1/2T23..., BD2-AK1/3T23..., BD2-AK1/T25...

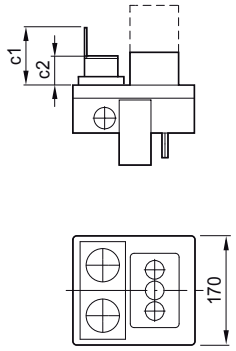


Figure 3-48 BD2-AK1/2CEE163

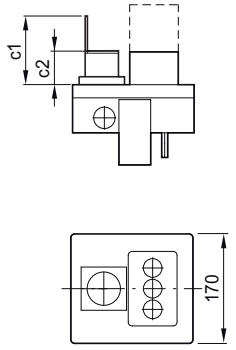


Figure 3-49 BD2-AK1/CEE165...

Type	c1	c2
BD2-AK1/3SD163..., BD2-AK1/3DK..., BD2-AK1/2T23..., BD2-AK1/3T23, BD2-AK1/T25...	71	13
BD2-AK1/2CEE163	88	44
BD2-AK1/CEE165	106	52

3.5.7.2 Tap-off units up to 63 A

Size 02 up to 63 A

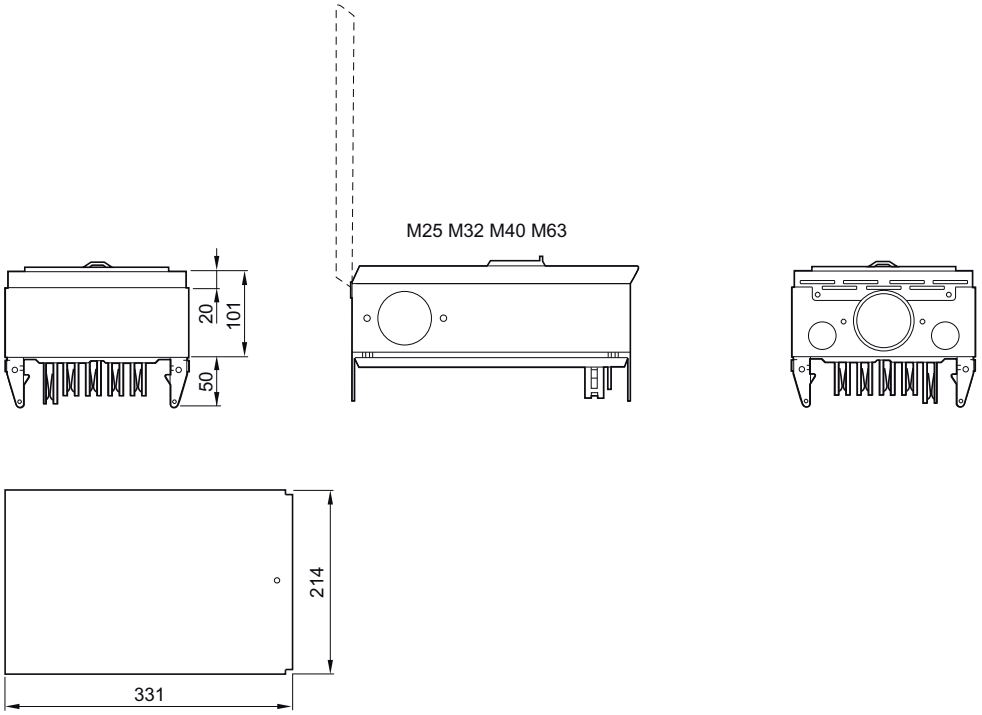


Figure 3-50 BD2-AK02X/F..., BD2-AK02X/GB..., BD2-AK02X/S...

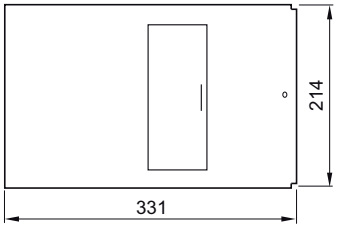


Figure 3-51 BD2-AK02M2/A..., BD2-AK02M2/F

Size 2 up to 63 A

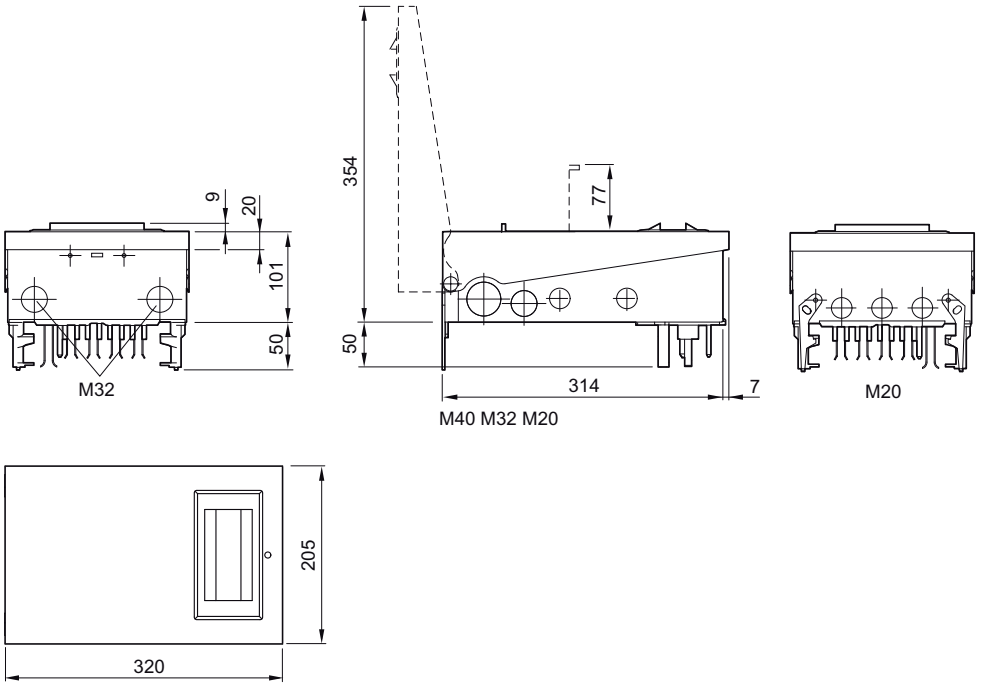


Figure 3-52 BD2-AK2X/F..., BD2-AK2X/GB..., BD2-AK2X/S...

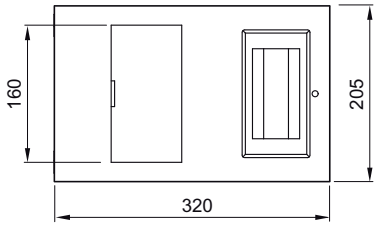


Figure 3-53 BD2-AK2M2/A..., BD2-AK2M2/F

Designs with CEE, BS and CH sockets as well as sockets with earthing contacts

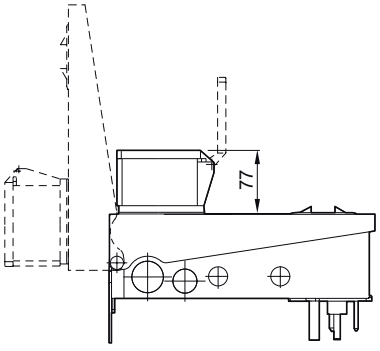
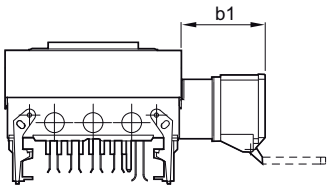
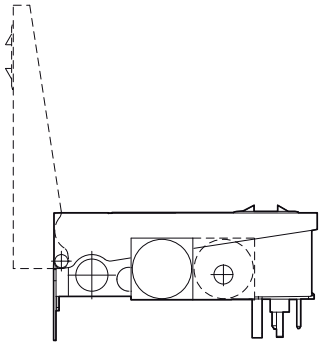


Figure 3-54 BD2-AK2X/CEE635S33





BD2-AK2X/CEE325S33
BD2-AK2M2/CEE325A323
BD2-AK2X/2CEE165S14
BD2-AK2M2/2CEE165A163
BD2-AK2X/2CEE165S27 (/FORMP)
BD2-AK2M2/T25...
BD2-AK2M2/T23(T25)...CEE165...
BD2-AK2M2/T23(T25)...CEE325...

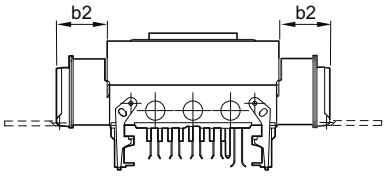


Figure 3-55 BD2-AK2X/3BS133...

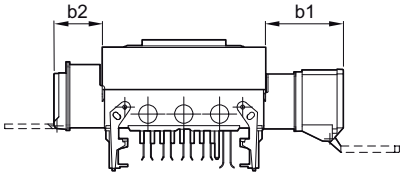


Figure 3-56 BD2-AK2M2/2SD163CEE165A163

Type	b1	b2
BD2-AK2X/CEE325S33 BD2-AK2M2/CEE325A323 BD2-AK2X/2CEE165S14 BD2-AK2M2/T23(T25)...CEE325	98	-
BD2-AK2X/2CEE165S27 (/FORMP) BD2-AK2M2/2CEE165A163 BD2-AK2M2/T23(T25)...CEE165	86	-
BD2-AK2M2/T25...	54	-
BD2-AK2X/3BS133...	-	54
BD2-AK2M2/2SD163CEE165A163	86	54

3.5.7.3 Tap-off units up to 125 A

Size 03 up to 125 A

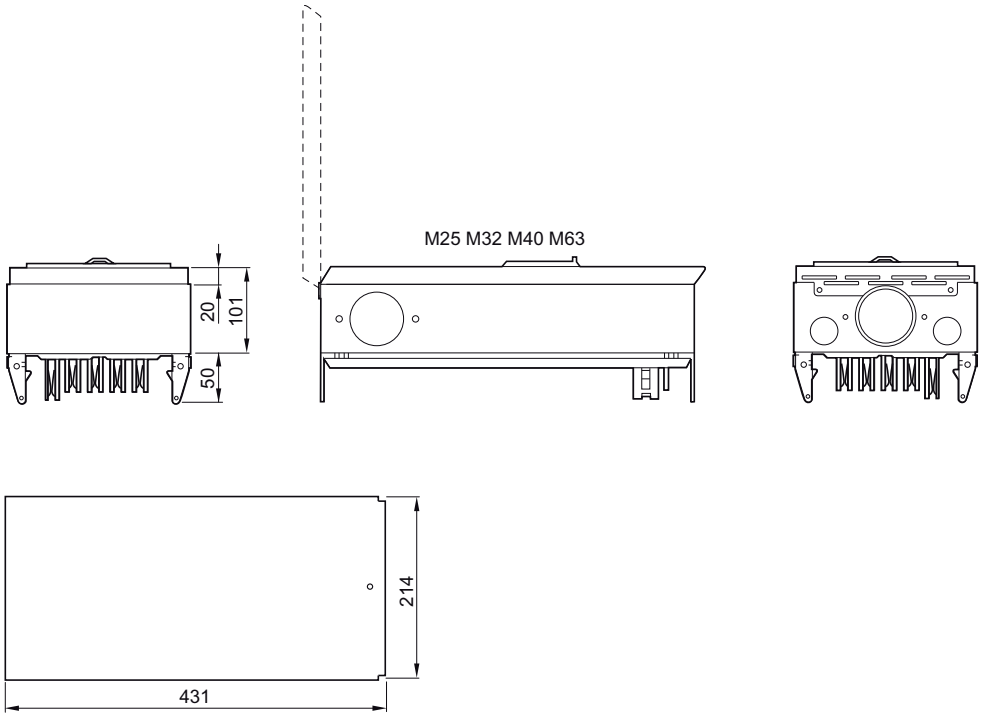


Figure 3-57 BD2-AK03X/F..., BD2-AK03X/GB..., BD2-AK03X/TPNR..., BD2-AK03X/SPNR...

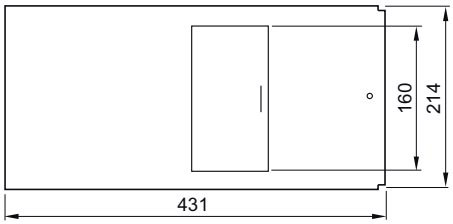
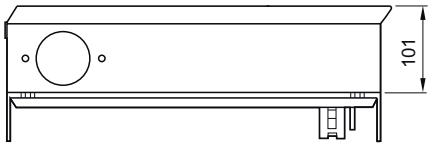
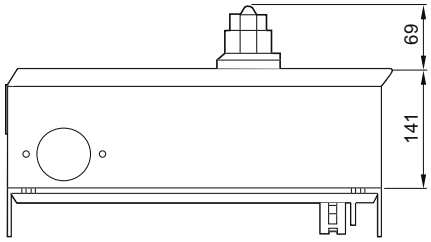


Figure 3-58 BD2-AK03M2/A...

Designs with fuse switch disconnector and circuit breaker



BD2-AK03X/GSTA00



BD2-AK03X/FS...

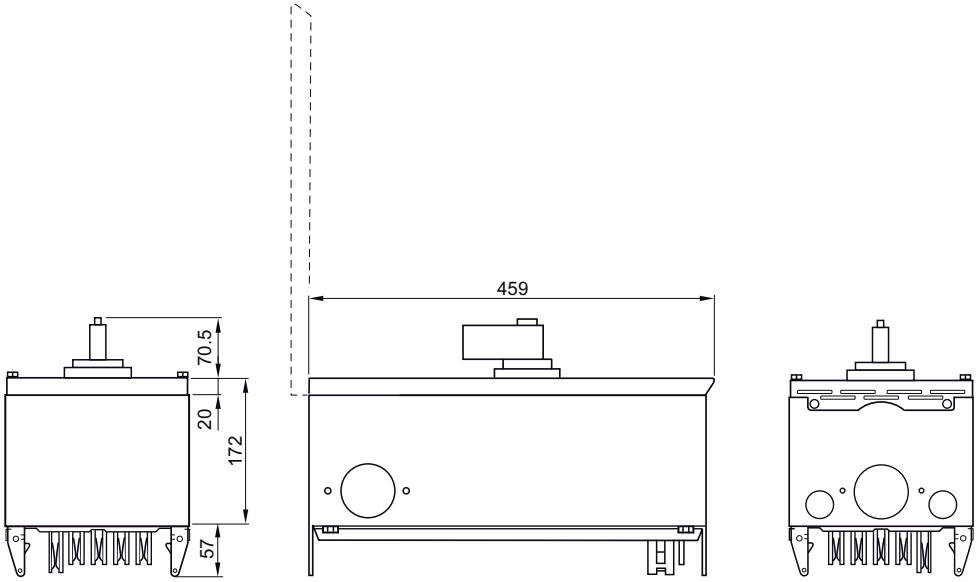


Figure 3-59 BD2-AK03X/LSD

Size 3 up to 125 A

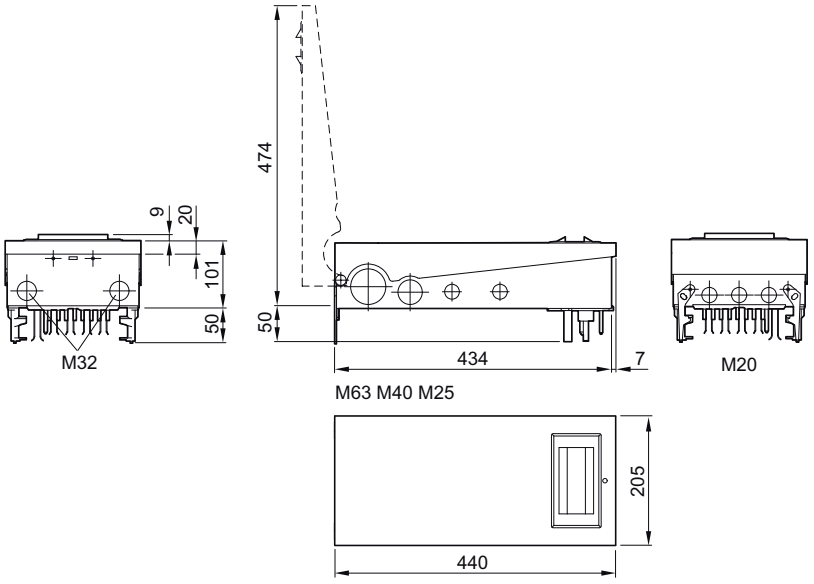


Figure 3-60 BD2-AK3X/GS00, BD2-AK3X/GB...

Design with fuse switch disconnector

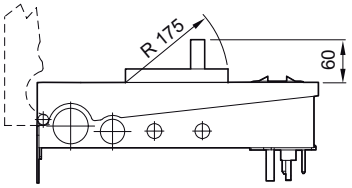


Figure 3-61 BD2-AK3X/GSTZ00

3.5.7.4 Tap-off units up to 250 A

Size 04 up to 250 A

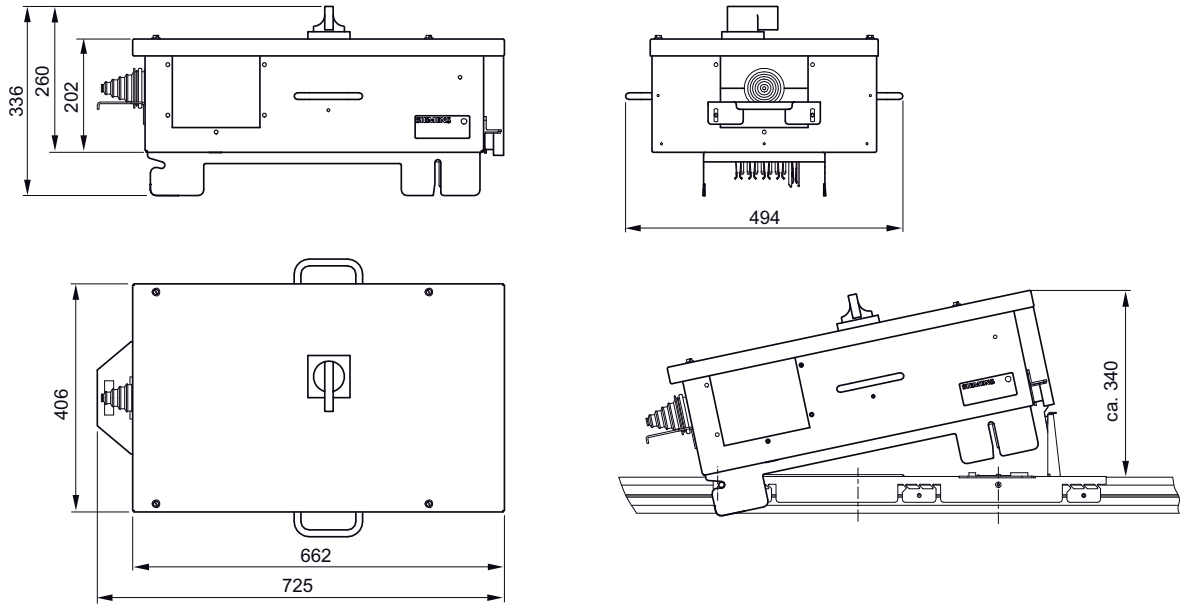


Figure 3-62 BD2-AK04/LSD...

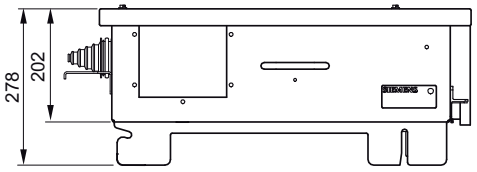


Figure 3-63 BD2-AK04/SNH1, BD2-AK04/GB250J-...

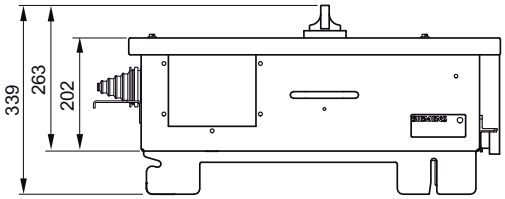


Figure 3-64 BD2-AK04/FS...

3.5.7.5 Tap-off units up to 530 A

Sizes 05, 06 up to 530 A

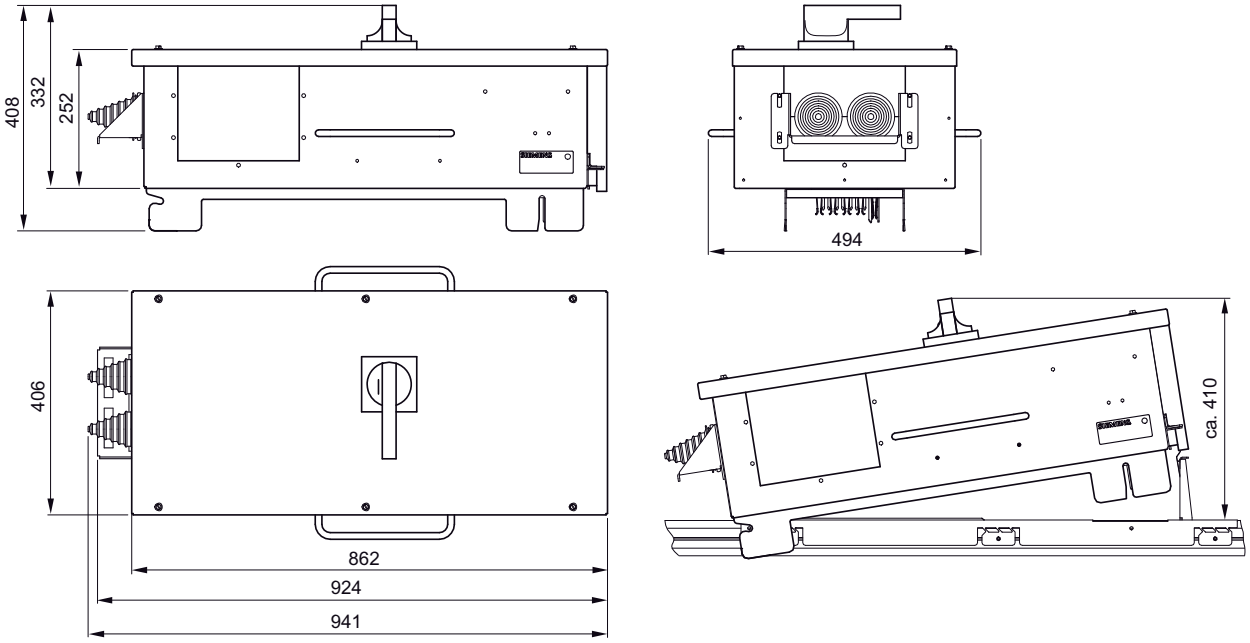


Figure 3-65 BD2-AK05/LSD..., BD2-AK06/LSD...

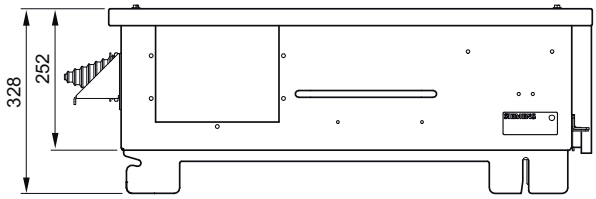


Figure 3-66 BD2-AK05/SNH2, BD2-AK06/SNH3

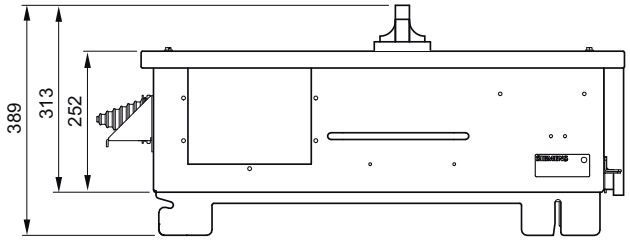
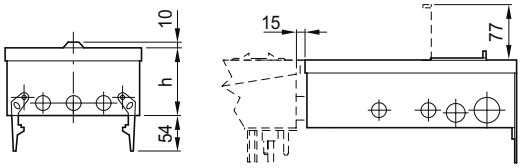


Figure 3-67 BD2-AK05/FS...

3.5.8 Ancillary equipment units



Type	h
BD2-GKM2/F	101
BD2-GKX/F	151

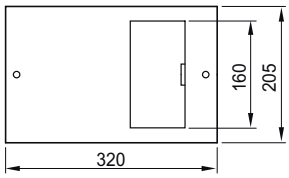


Figure 3-68 BD2-GKM2/F

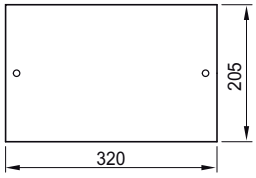
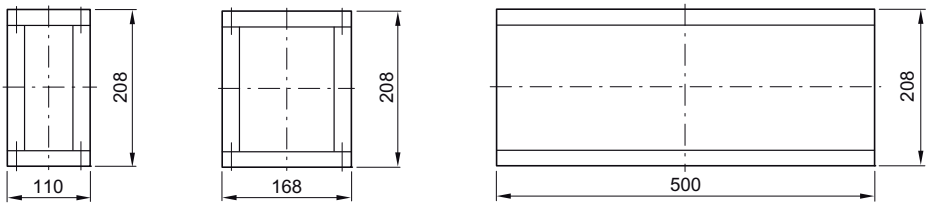


Figure 3-69 BD2-GKX/F

3.5.9 Additional equipment

Bushing protector



BD2-400-D BD2-1250-D BD2-...-D

Fire protection

+BD2-S90 (S120)-...

BD2.-160 (-250, -400)-...

BD2.-630 (-800, -1000, -1250)-...

Joint block

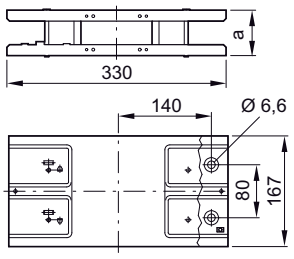
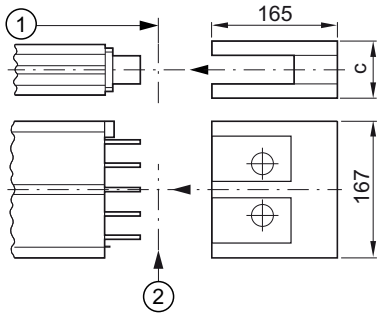


Figure 3-70 BD2-400-SK, BD2-1250-EK

Type	a mm
BD2-400-SK	68
BD2-1250-EK	126



① Length of trunking unit
② End of end cap = centre of joint block

Figure 3-71 BD2-400-FE, BD2-1250-FE

Type	c mm
BD2-400-FE	68
BD2-1250-FE	126

Mounting

Fixing bracket, flat and edgewise

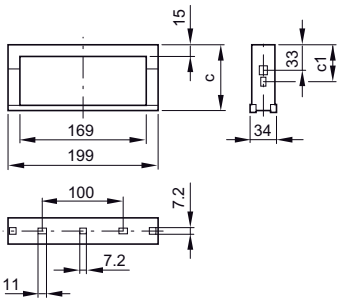


Figure 3-72 BD2-400-BB, BD2-1250-BB

Type	c mm	c1 mm
BD2-400-BB	86.5	48
BD2-1250-BB	144.5	77

Spacer

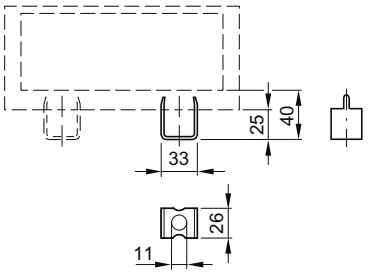


Figure 3-73 BD2-DSB

Spacer bracket

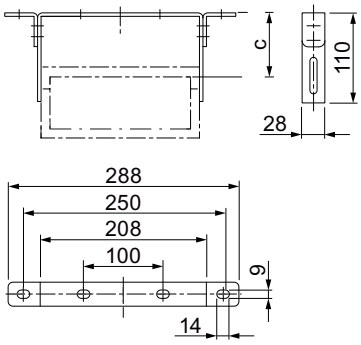


Figure 3-74 BD2-BD

Type	c mm
BD2-400-BD	30 ... 82
BD2-1250-BD	50 ... 82

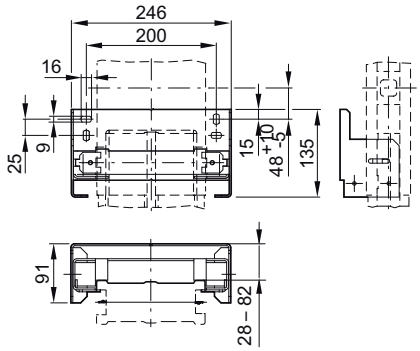
Note

Mounting on a concrete wall

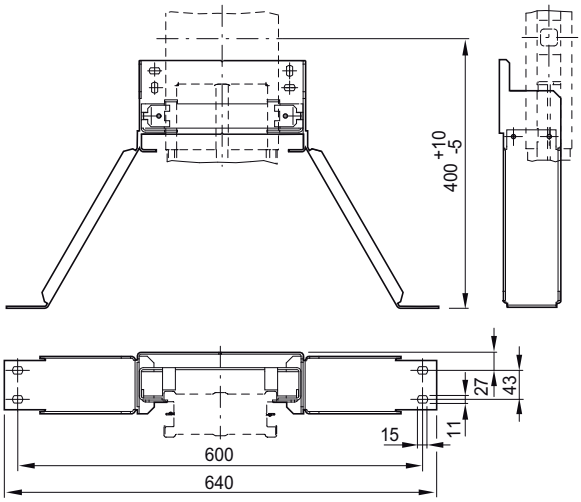
In the case of mounting directly on a concrete wall, use only steel and straddling dowel pins compliant with building regulations, e.g.:

- Order no. 15J1-A08/40 by RICO
- SLM8N item no. 50521 by Fischerwerke

Vertical fixing elements

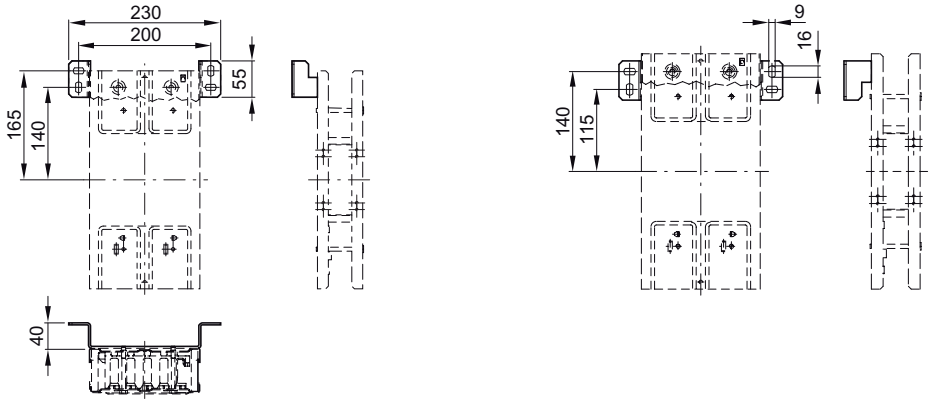


BD2-BWV



BD2-BDV

Vertical fixing bracket



BD2-BVF

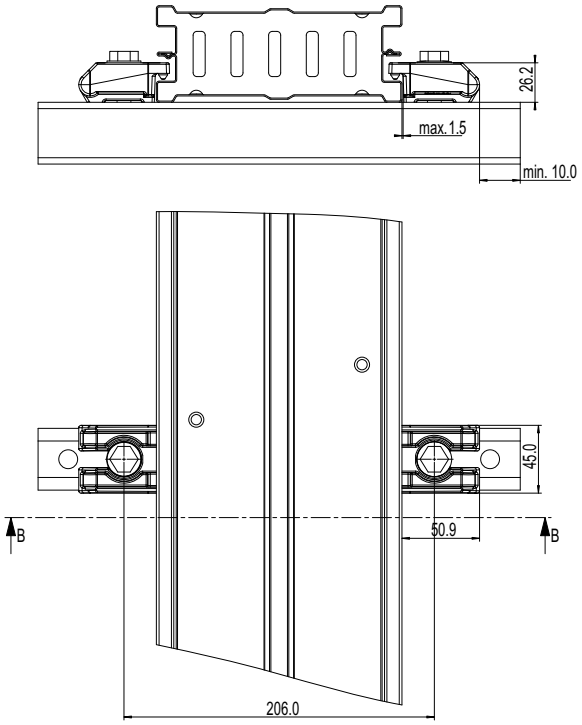
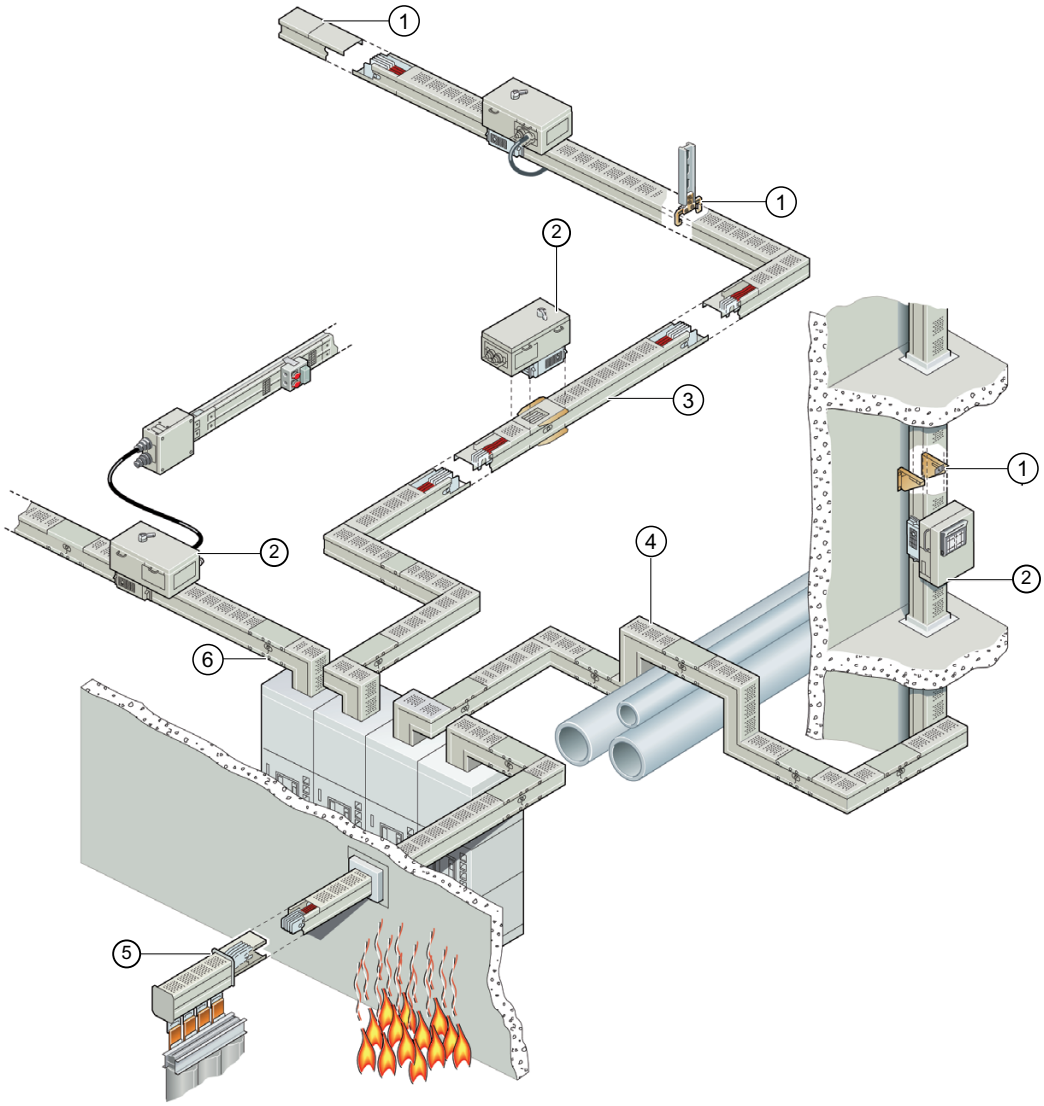


Figure 3-75 BD2-BVC

Planning with LD

4

4.1 System description



① Additional equipment
② Tap-off units
③ Straight trunking units
④ Junction units
⑤ Feeder units
⑥ Distribution board connection units

Figure 4-1 Overview of LD busbar trunking system

The LD busbar trunking system is used for both power transmission and distribution. The system offers a high short-circuit rating and is particularly suited for the connection of transformers to low-voltage main distribution boards and sub-distribution boards.

In applications where high powers are required, conventional systems frequently require the use of parallel cables. The LD system offers optimal power distribution for both horizontal and vertical busbar runs. Coded plug-in tap-off units up to 1250 A that meet extremely high safety standards are available for this purpose.

4.2 System components

4.2.1 Preliminary technical descriptions for specifications

The busbar trunking systems should be offered as type-tested low-voltage switchgear and controlgear assemblies TTA to IEC/EN 60439-1 and -2, DIN VDE 0660 Part 500 and Part 502 (German standard), as a steel-encapsulated ready-to-connect system.

The distribution systems must be suitable forpower transmission, e.g. between transformer and low-voltage main distribution boards, as well as for power distribution providing a supply of power to an entire area.

The brand offered must be a complete system consisting of system modules, including transformers and elements for connection to the distribution boards, as well as such as brackets, straight trunking units and junction units. All components should be available both in straight and offset versions.

Trunking units with tap-off openings should be able to be equipped with coded tap-off units. Tap-off units are protected against incorrect mounting. Depending on the type, the isolation of the tap-off units during removal is assured by a compulsory sequence of operations or by cautionary instructions.

If required, the busbar trunking system should be capable of being equipped with asbestos-free fire barriers which comply with fire resistance class S 120, and which have been certified by the local or government authority responsible for building standards. The trunking unit's steel enclosure is made of moulded steel profiles to permit large fixing distances between suspension points. Theenclosure is galvanised and painted in a light grey colour (RAL 7035).

The external dimensions may not exceed 180 x 180 (240) mm.

The individual system modules are connected by hanging a hook from a bolt and tightening a state-of-the-art maintenance-free single-bolt clamp. The conductor between two system units should not be connected with screws.

The conductor material is made of aluminium or of copper if the rated current requires. The aluminium conductor must be nickel-plated and tinned, and the copper conductor must be tinned and provided with an additional insulating layer of epoxy-resin.

The fire load must not exceed the value specified in the technical data. Junction units with flexible connections or cable connections are not permitted.

The following certificates or declarations of conformity must accompany the offer:

- DIN ISO 9001 QA certification
- Proof of sprinkler testing
- Proof of prevention of propagation of an arcing fault
- Proof that the system is maintenance-free

Following the general information, a precisedescription of the system based on the technical requirements should be provided as follows:

Technical data for LD busbar trunking system

Rated current		_____ [1]
Degree of protection		IP34/IP54
Mounting position		Horizontal/vertical [2]
Rated insulation voltage		1000 V AC
Rated operating voltage		1000 VAC
Rated frequency		50 / 60 Hz [3]
Rated peak withstand current I_{pk}		_____ [1]
Rated short-time withstand current I_{cw} (1 s)		_____ [1]
Conductor material		Al/Cu [2]
No. of conductors		L1 – L3 and PEN (4 bars/4-pole) L1 – L3 and ½ PEN (7 bars/4-pole) L1 – L3 and PEN (8 bars/4-pole) L1 – L3, N, PE (5 bars/5-pole) L1 – L3, ½ N, ½ PE (8 bars/5-pole) L1 – L3, N, ½ PE (9 bars/5-pole)
Fire load without tap-off points		_____ [1]
Enclosure dimensions	LDA1 to LDC3	180 x 180 mm [2]
	LDA4 to LDC8	240 x 180 mm [2]

[1] Enter data for selected systems. See technical data for values.

[2] Please delete as appropriate.

[3] In accordance with EN60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

Important planning information

The nominal mounting position of the busbar trunking system is horizontal and edgewise for the busbars. In very rare cases, due to a specific trunking run or the option of connecting tap-off units on the side, the busbars might have to be laid flat. The resulting increase in the internal heat rise of the system necessitates a reduction in rated current. The same applies to vertical height rises > 1.3 m (see the table in the next section "Type codes").

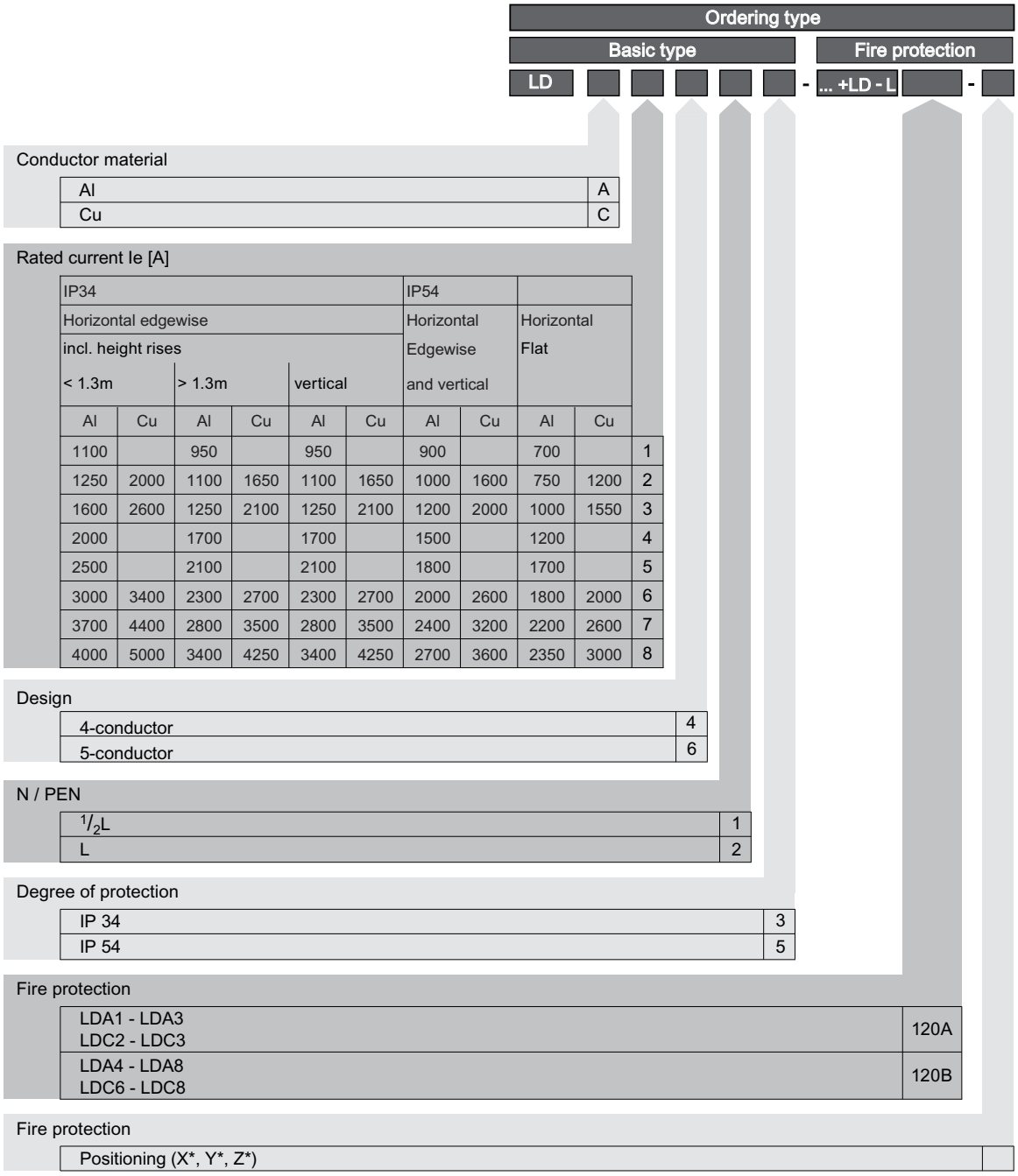
The LD busbar trunking system is a ventilated system. When the degree of protection is increased from IP34 to IP54 (enclosed system), the rated current must be derated as specified in the tables in the next section.

4.2.2 Type code

Definition of the required system using the type code

The basic components of the LD system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material, system type and degree of protection.

The resulting type code enables the required system to be precisely defined.



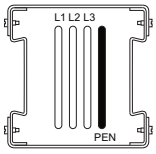
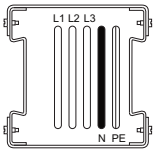
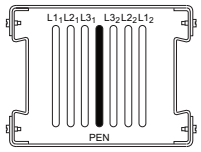
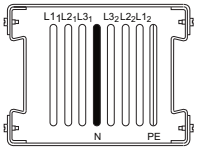
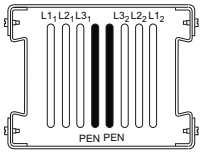
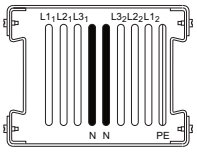
Selection example

A rated current of 2500 A is calculated for a project. Aluminium conductors shall be used. A 4-pole system has to be used. The cross section of the protective conductor needs to be equal to the cross section of the phase conductor. The required degree of protection is IP34. The mounting position is horizontal, edgewise, without height rises. Use of the above table results in the selection of the following type:

LDA 5423

4.2.3 Sizes, conductor configurations and structure of the busbar package

The LD busbar trunking system is available in two sizes. You can also select the line system configuration (4-pole/5-pole) and the size of the N/PEN cross section as appropriate for your application.

Conductor configuration	4-pole	5-pole
180 mm x 180 mm	PEN = L	PE = N = L
LDA1.2. to LDA3.2. LDC2.2. to LDC3.2.		
240 mm x 180 mm	PEN = ½ L	PE = N = ½ L
LDA4.1. to LDA8.1. LDC6.1. to LDC8.1.		
240 mm x 180 mm	PEN = L	PE = ½ L, N = L
LDA4.2 to LDA8.2. LDC6.2. to LDC8.2.		

Structure of the busbar package

An example a 7-bar system (sectional view) is illustrated below. The positions of the individual phases and the protective conductor PEN are indicated. You can also see the enclosure profile.

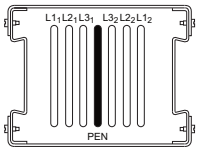
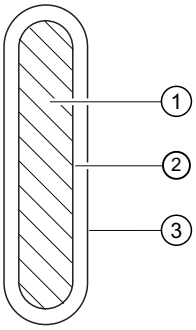


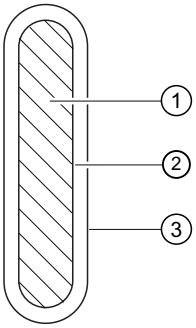
Figure 4-2 Sectional drawing of a 7-bar system

LD busbar systems are available with aluminium (LDA....) and also copper (LDC....) conductor materials. Due to the conductors' special surface finishing, trunking units with different conductor materials can be combined. In addition to tinning, aluminium bars are also coated with a layer of nickel.



① Aluminium bar
② Nickel layer, tinning
③ Moulded-plastic coating with high heat resistance

LDA busbar systems with aluminium conductors



① Copper bar
② Tinning
③ Moulded-plastic coating with high heat resistance

LDC busbar systems with copper conductors

In order for short-circuit rating to be assured and for the pitch of the bars to be maintained, bar supports are fitted every 200 mm (see diagram):

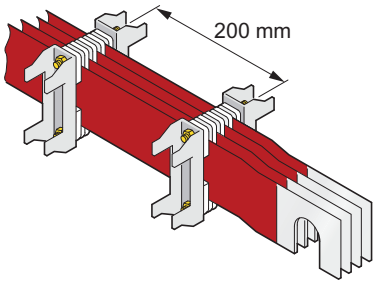
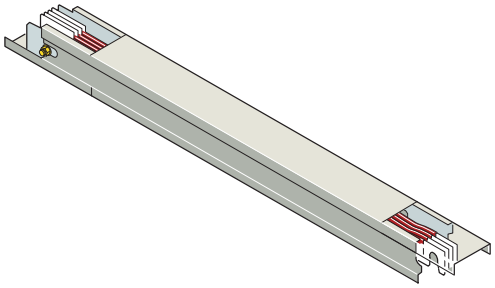


Figure 4-3 Bar supports fitted

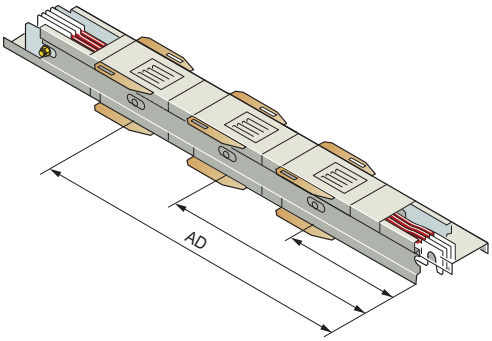
4.2.4 Straight trunking units

Straight trunking units are used to transmit electrical power and to supply loads.

Straight trunking units for horizontal installation



Without tap-off points



With tap-off points

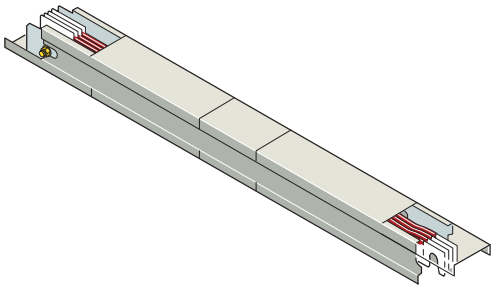
	Length	Type
Standard lengths	1.6 m	LD.....-1.6
	2.4 m	LD.....-2.4
	3.2 m	LD.....-3.2
Optional lengths	0.50...0.89 m	LD.....-1W*
	0.90...1.59 m	LD.....-2W*
	1.61...2.39 m	LD.....-3W*
	2.41...3.19 m	LD.....-4W*
Straight trunking unit for expansion compensation	1.2 m	LD.....-D
Standard lengths with 1, 2 or 3 tap-off points	3.2 m	LD.....-K-3, 2-3AD 3 tap-off points
	3.2 m	LD.....-K-3,2-2AD 2 tap-off points
	3.2 m	LD.....-K-3.2-AD 1 tap-off point
Optional lengths with 2 tap-off points	2.20...2.40 m	LD.....-K-2W*-2AD
	2.41...3.20 m	LD.....-K-3W*-2AD
Optional lengths with 1 tap-off point	1.20...1.60 m	LD.....-K-1W*-AD
	1.61...2.40 m	LD.....-K-2W*-AD
	2.41...3.20 m	LD.....-K-3W*-AD

W = optional length

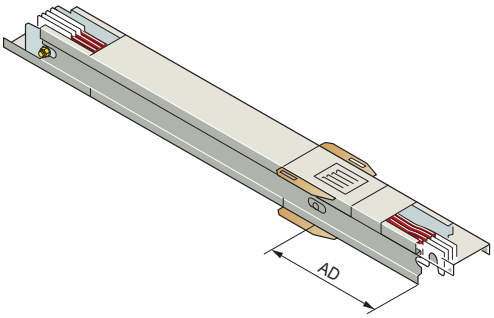
* = length in m

AD Tap-off point

Straight trunking units for vertical installation



Without tap-off points with integrated expansion compensation



With 1 tap-off point and integrated expansion compensation

	Length	Type
Standard length	2.4 m	LD.....-V-2.4
	3.2 m	LD.....-V-3.2
Optional lengths	2.29 ... 2.80 m	LD.....-V-1W*
	2.81 ... 3.00 m	LD.....-V-2W*
	3.01 ... 3.19 m	LD.....-V-3W*
Standard lengths with 1 tap-off point	2.4 m	LD.....-K-V-2.4-AD
	3.2 m	LD.....-K-V-3.2-AD
Optional lengths with 1 tap-off point	2.29 ... 2.80 m	LD.....-K-V-1W*-AD
	2.81 ... 3.00 m	LD.....-K-V-2W*-AD
	3.01 ... 3.19 m	LD.....-K-V-3W*-AD

W = optional length
* = length in m
AD Tap-off point

Note

Expansion compensation

Due to heat dissipation at rated load, the busbars in the trunking unit expand. To compensate this expansion in length, you need to include expansion compensation units at defined intervals when planning your horizontal installation.

With trunking units for vertical installation, the expansion compensation is integrated.

When planning horizontal busbar runs, please remember:

- A straight trunking run without expansion compensation between two junction units must not exceed 10 m in length.
- A straight trunking run between a junction unit and the end cap must not exceed 25 m in length. In the case of longer trunking run lengths, planning provision has to be made accordingly for expansion compensation units.

Tap-off points

Tap-off points are only possible on straight trunking units (both standard lengths and optional lengths possible). Options are:

- Tap-off point on TOP: ...-AD
- Tap-off point BOTTOM: ...-ADU
- Tap-off points on TOP and BOTTOM: ...-ADO+U

With a trunking unit with a tap-off point at the TOP and BOTTOM, only one tap-off unit can be used at a time. The required distance between tap-off points is 1 m.

The required type should be determined during engineering, based on the mounting position of the busbar.

In the case of optional trunking units with tap-off point, a minimum clearance of 0.6 m is required between the end of the busbar and a tap-off point.

A coding bracket is located on both sides of a tap-off point. This guarantees non-interchangeability and correct phasing sequence installation of the tap-off units.

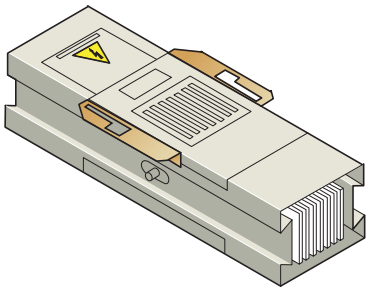
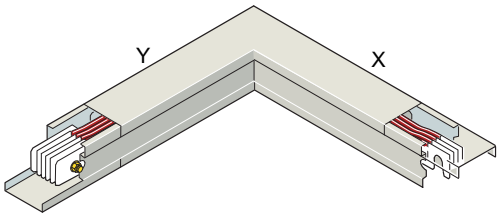


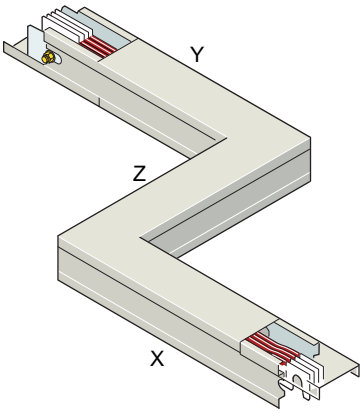
Figure 4-4 Trunking unit with tap-off point

4.2.5 Junction units

Junction units for horizontal installation



Elbow LD.....-L...



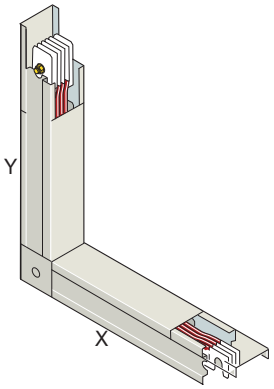
Z unit LD.....-Z.-Z*

Length	Type
X = 0.5...1.24 m Y = 0.5...1.24 m	LD.....-L...

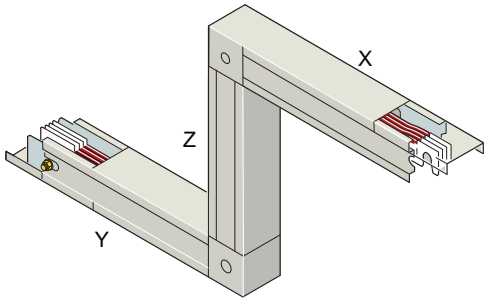
Length		System	Trunking unit	Type
X/Y = 0.5 m	Z = 0.36 ... 0.99 m	LD.1 to LD.3	180 x 180 mm	LD.....-Z.-Z*
	Z = 0.48 ... 0.99 m	LD.4 to LD.8	240 x 180 mm	

*	Optional length in m

Junction units for horizontal and vertical installation

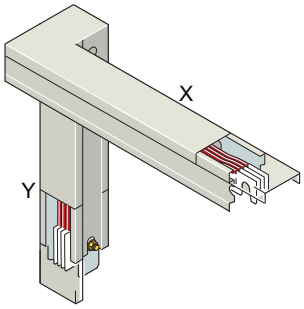


Elbow LD.....-L.

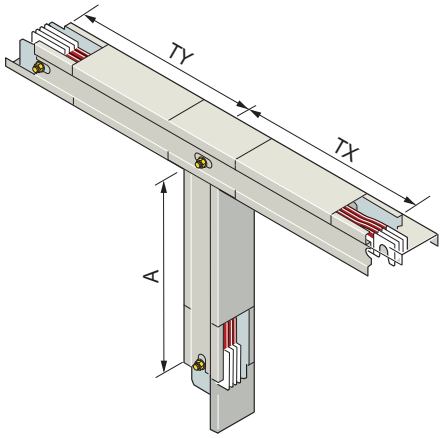


Z unit LD.....-Z.-Z*

Length	Type
X = 0.5...1.24 m Y = 0.5...1.24 m	LD.....-L...
X = 0.5...1.24 m Y = 0.5...1.24 m Z = 0.36...0.99 m	LD.....-Z.-Z*



Offset knee LD.....-L.



T unit LD.....-T.

Length	Type
X = 0.5...1.24 m Y = 0.5...1.24 m	LD.....-L...
TX = 0.58 m TY = 0.62 m A = 0.5 m	LD.....-T.

4.2.6 Distribution link for Siemens power distribution boards

Connection to the Siemens SIVACON power distribution system as type-tested low-voltage switchgear and controlgear assembly (TTA) compliant with DIN EN 60439-1 and DIN EN 60439-2

The busbar trunking system can be linked to the distribution system from above or below. The link between the busbar trunking system and the SIVACON 8PV, 8PT, S4 and S8 distribution system ensures high short-circuit rating backed up by type testing and huge reliability as regards power transmission.

Rated currents

All modules for rated currents up to 5000 A have been type tested.

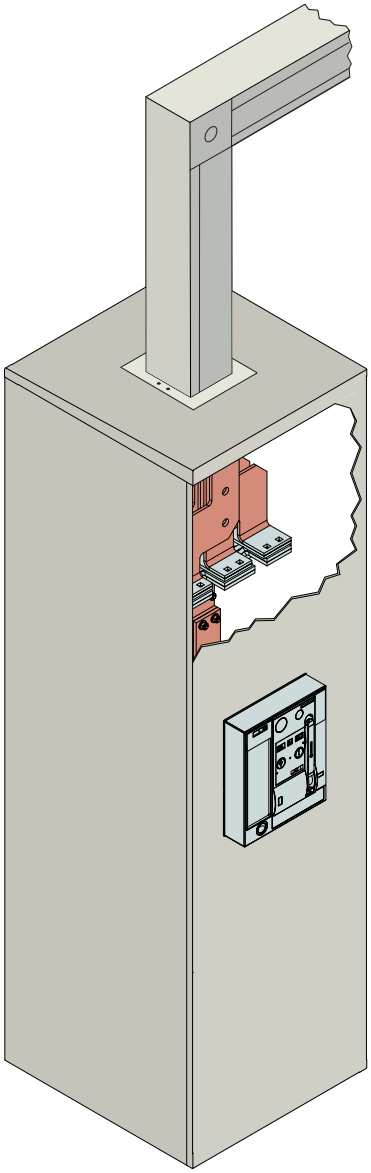


Figure 4-5 Distribution board link

4.2.7 Connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using an LD connection unit for non-Siemens distribution boards .... . The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Rated currents

- The maximum rated currents are listed in the Technical data section.
- The temperature limit of busbars coated with insulating materials is 135°C.
- Possible conductor cross sections for the copper connections are also listed in the Technical data section.

Installing the connection unit

The connections in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit rating is achieved and the permissible temperature limit of the non-Siemens connection unit is not exceeded.

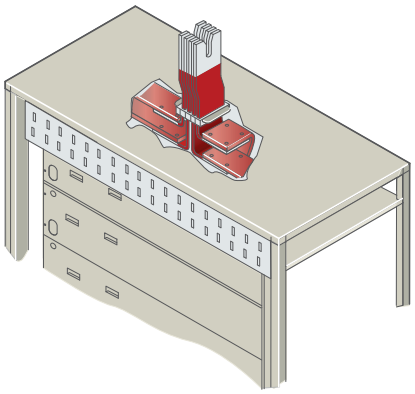
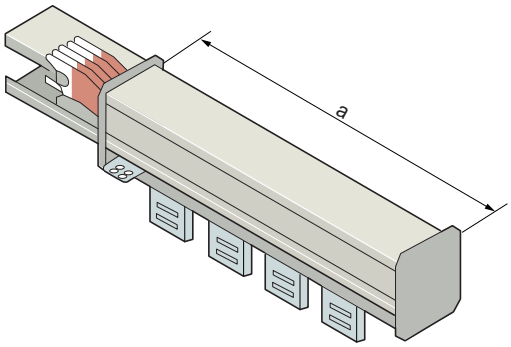


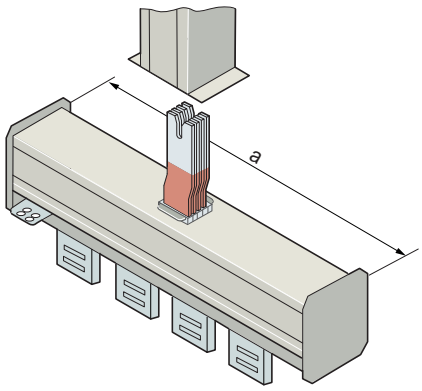
Figure 4-6 Connection unit for non-Siemens distribution boards

4.2.8 Connection unit for transformers and distribution boards

There are four different transformer connection pieces (LD.....-AS.) available for all rated current ranges to connect various transformers to a busbar trunking system:



Connection unit LD.....-AS...



Connection unit LD.....-AS.-T

Type of connection unit	Selectable phase clearance	Possible phase sequences
LD.....-AS1(-T)	150...180 mm a = 725 m	L1, L2, L3, PEN PEN, L3, L2, L1
LD.....-AS2(-T)	190...380 mm a = 1085 m	L1, L2, L3, PEN PEN, L3, L2, L1
LD.....-AS3(-T)	450...750 mm a = 1430 m	Lx, PEN, L2, Lx Lx, L2, PEN, Lx Lx = L1 or L3
LD.....-AS4(-T)	450...750 mm a = 1930 m	L1, L2, L3, PEN PEN, L3, L2, L1

We recommend a maximum clearance of 200 mm between the tags on the connection piece.

The universal connection unit can also be used to connect distribution boards.

4.2.9 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an LDA(C)....-KE incoming cable connection unit.

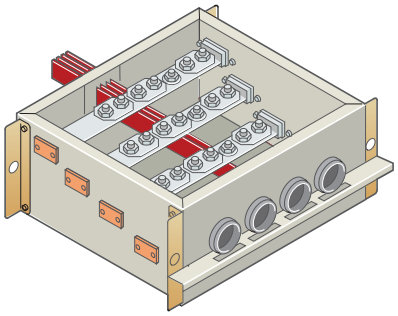


Figure 4-7 Incoming cable connection unit

The incoming cable connection unit is designed for the following rated currents:

- 1100 to 2600 A (with IP34)
- 900 to 2000 A (with IP54).

Enclosure sizes

Depending on the system, three sizes can be selected:

Size 1: LDA1...-KE to LDA2...-KE
Size 2: LDA3...-KE and LDA4...-KE
LDC2...-KE
Size 3: LDA5...-KE.

The maximum dimensions are 920 mm x 639 mm x 490 mm (W x H x D).

IP34 or IP54 degree of protection can be selected.

You can connect single-core or multi-core cables. You can connect cross sections up to 300 mm^2 (bolted connection) directly to the incoming cable connection unit bars.

The sheet steel flange plates and the cable sleeves are included in the scope of supply of the standard product. Single-core cables are supplied with an undrilled aluminium plate for cable entry.

4.2.10 Coupling units

Coupling units are used if devices or sections of the power supply need to be disconnected or connected accordingly. To adapt the busbar trunking system to the actual load, the busbar cross section can be reduced and protected against short circuits and overloads with a coupling unit.

Coupling units can be fitted with switch disconnectors or circuit breakers as appropriate for their application. Coupling units resistant to accidental arcs can be supplied as an option.

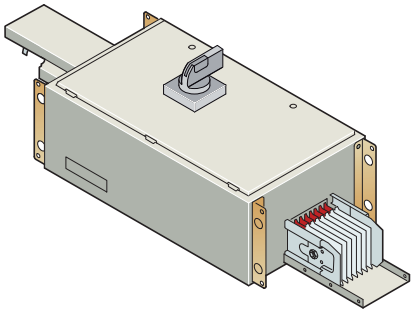


Figure 4-8 Coupling units

Rated currents

Rated currents adapted to the systems between 1100 and 3000 A can be supplied as appropriate for the application.

Operator control

The coupling units can be operated using a handle or even a motor drive.

Dimensions

The installation length in the busbar trunking run is 1600 mm.

The dimensions are dependent on the device type and the current size and must be obtained project-specifically.

4.2.11 Tap-off units

Tap-off for different current ratings

Tap-offs for different current ratings are required, depending on the application and type and size of loads. These tap-offs are implemented in the form of tap-off units with fuse switch-disconnectors or with circuit breakers.

There are basically two types of tap-off unit:

- With fuse switch disconnector
- With circuit breaker

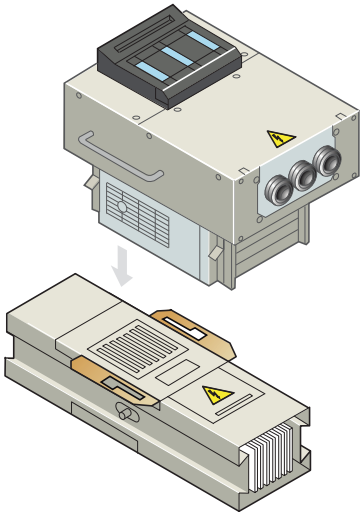


Figure 4-9 Tap-off unit with fuse switch disconnector and trunking unit with tap-off point

Early-make PE/PEN

The current tap in the tap-off unit is implemented as an early-make (mounting) or late-break (removal) PE/PEN conductor contact.

In a 4-conductor system, this is ensured by a longer PEN bar at the contact mechanism. In a 5-conductor system the PE connection is established via grinding contacts on the coding brackets.

Anti-rotation feature and non-interchangeability

The coding brackets on the tap-off unit and on the trunking unit's tap-off point (lock-and-key principle) ensure:

- Non-interchangeability and correct assignment of 4 or 5-pole tap-off units to the associated LD systems
- Orientation feature to prevent incorrect connections between the tap-off units and tap-off points

4.2.11.1 Tap-off units with fuse switch disconnector

Rated currents

Tap-off units 125 A, 2 x 125 A, 250 A, 400 A and 630 A are available for selection.

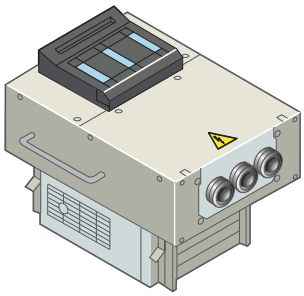
Depending on the current level, LV HRC fuses size NH 00, NH 1, NH 2 or NH 3 are used. The compact dimensions mean that only one enclosure size is required for all rated current ranges.

Operator control

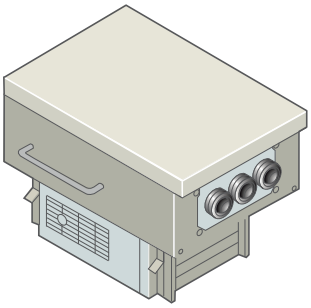
The tap-off units with fuse switch disconnector are operated by hand using a swivel mechanism.

Degree of protection

The standard degree of protection is IP30. IP54 degree of protection can be provided as an option.



Degree of protection IP30



Degree of protection IP54

Cable compartment/cable entry

A bolted connection is used for cables with cross sections up to 2 x 240 mm^2. In the standard version, the cable entry is on the front face. Adding a cable compartment enables cable entry from the side. The cables are routed via an integrated cable propping bar in the tap-off unit (cleats to be provided by the customer). The sectional flange plate facilitates the laying of the cables.

Opening the tap-off unit

Do not open the cable compartment cover until you have removed the fuse switch disconnector handle and, consequently, the fuse. This will ensure that the cable compartment is voltage-free when the cover is removed. The part of the contact device in the front of the tap-off unit is "finger-proof".

Type designation

The type designation for tap-off units with LV HRC fuse switch disconnectors is LD-.AK/3ST...

4.2.11.2 Tap-off units resistant to accidental arcs and with fuse switch disconnector

Rated currents

Two tap-off units for 400 A and 540 A are available for selection for use with LV HRC fuses.

Operator control

The LV HRC fuse links of size NH 3 are switched on and off via the door-coupling operating mechanism.

Degree of protection

The standard degree of protection is IP54.

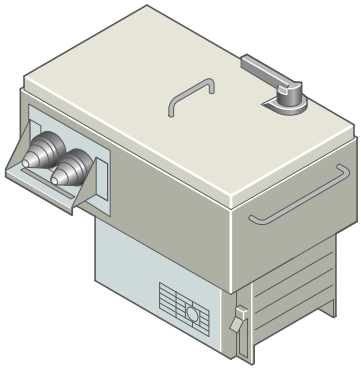


Figure 4-10 Degree of protection IP54

Cable compartment/cable entry

A bolted connection is used for cables with cross sections up to 2 x 4 x 240 mm^2. Cables can be fed in on both sides. In the case of a single-core cable entry, an aluminium plate fitted with metric screwed joints is included in the scope of supply.

Resistance to arc faults

The tap-off units are resistant to arc faults. This has been verified by means of accidental arc testing to IEC 439-1 Supplement 2, EN 60439-1 Supplement 2, VDE 0660 Part 500 Supplement 2 and confirmed by a test report.

Type designation

The type designation for tap-off units with LV HRC switch disconnectors is LD- AK./FSAM.

4.2.11.3 Tap-off units with circuit-breakers

On tap-off units with circuit breakers you can select the switching capacity, the number of actively switched poles, the type of operator control and the signalling options:

- Rated currents from 100 A to 1250 A.
- 3 or 4-pole designs
- Switching capacity: normal, standard or high (see Technical data)

Circuit breaker with manual operating mechanism

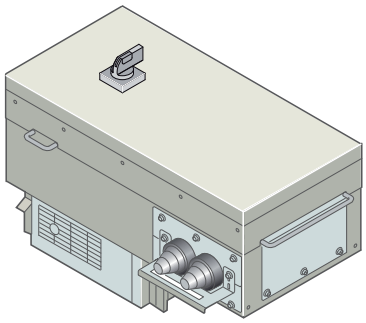


Figure 4-11 Circuit breaker with manual operating mechanism

This type of tap-off unit has a circuit breaker which can be controlled from the outside using a handle.

Degree of protection

The tap-off units have IP54 degree of protection.

Opening the tap-off unit

The contact compartment and the copper connections between the contact mechanism and the circuit breaker are encapsulated in a finger-proof casing. The cover can only be opened if the breaker has been deactivated. This ensures voltage-free load when the cover is removed.

Cable connection

On the load side, the outgoing cables are routed directly via the circuit breaker. The PE/PEN conductor is fixed to a bolted connection as appropriate for the cross section. Single-core or multi-core cables can be fed in from the side or via the front face. The sectional flange plate facilitates the laying of the cables.

Circuit breaker with door handle, also available with motor drive

This version has a motor drive instead of a door handle.

Furthermore, you can choose either an undervoltage or a shunt release as appropriate for your application. The operating voltage of the motorised operating mechanism must be ensured externally (220 V AC to 250 V AC). The connections for the motor drive are designed for terminal connection.

The feeder compartment and the copper connections between the contact mechanism and the circuit breaker are encapsulated in a finger-proof casing. The connection on the load side is made in the same way as on the version with door handle.

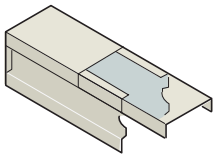
Type designation

The type designation for tap-off units with circuit breakers is LD-.AK./LS.

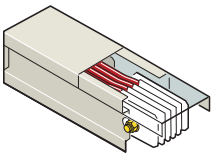
4.2.12 Additional equipment

End caps

You will need to install an end cap with a hook or a bolt at the end of a busbar run depending on the version of the trunking unit.



End cap with hook



End cap with bolt

Suspension bracket

The LD-B1/B2 suspension bracket is used to mount the busbar trunking system in a horizontal installation.

- B1 for enclosure dimensions 180 mm x 180 mm
- B2 for enclosure dimensions 240 mm x 180 mm

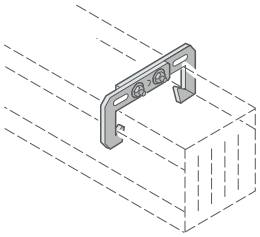


Figure 4-12 Suspension bracket

Fixing bracket

If you install the LD system vertically, you will need to use the LD-BV fixing bracket (for fixing distances, see the Dimension drawings section).

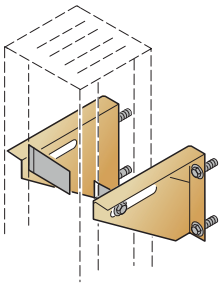


Figure 4-13 Fixing bracket

4.3 Technical data

4.3.1 LD general data

Standards and regulations		IEC 60439-1 and -2, DIN EN 60439-1 and -2
Resistance to extreme climates		
• Damp heat, constant, to IEC 60068-2-78		40°C / 93% / RH / 56d
• Damp heat, cyclic, to IEC 60068-2-30		56 x (25-40°C/3h ; 40°C/9h ; 40-25°C/3-6h ; 25°C/6h)/95% RH
• Cold in accordance with IEC 60068-2-1		-45°C, 16h
• Temperature change in accordance with IEC 60068-2-14		-45° to 55°C; 5 cycles (1°C/min); holding time min. 30 min
• Salt spray test in accordance with IEC 60068-2-52		degree of severity 3
Ambient temperature min./max./24-hour average	°C	–5/+40/+35
Environmental classes		1K5, 3K7L, 2K2, 1C2, 2C2, 3C2, 1B2, 2B2, 3B2, 1S2, 2S2, 3S2
Degree of protection		IP31 ventilated (with busbars installed horizontally and flat) IP34 ventilated (with busbars installed horizontally and edgewise) IP54 enclosed
Standard mounting position		Busbars installed edgewise in trunking units with horizontal installation
Torque for single-bolt terminal	Nm	80
Busbar surface treatment		Entire length coated with insulating material, nickel-plated and tinned: LDA; tinned: LDC
Material trunking units, tap-off units		Sheet steel with powdered paint finish
Colour of trunking units, tap-off units		RAL 7035 (light grey)
Dimensions		See Dimension drawings
Weight		See Chapter Weights (Page 144)
Rated insulation voltage to DIN EN 60439-1	V AC	1000
Rated operational voltage (power transmission)		
• with overvoltage category III/3	V AC	1000
• with overvoltage category IV/3	V AC	690
Rated operational voltage (power distribution)	V AC	400 (690) [1]
• with overvoltage category III/3		
Rated frequency	Hz	50 / 60 [2]

[1] Tap-on units on request

[2] In accordance with EN60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

4.3.2 LDA.4.. trunking units (4-pole, aluminium)

System-specific data				LDA142.	LDA242.	LDA342.	LDA441.	LDA442.	LDA541.	LDA542.
				PEN=L	PEN=L	PEN=L	PEN=½L	PEN=L	PEN=½L	PEN=L
Rated current I_e[1]										
Horizontal/ edgewise [2]	IP34	I_e	A	1100	1250	1600	2000	2000	2500	2500
	IP54	I_e	A	900	1000	1200	1500	1500	1800	1800
Vertical	IP34	I_e	A	950	1100	1250	1700	1700	2100	2100
	IP54	I_e	A	900	1000	1200	1500	1500	1800	1800
Horizontal/flat	IP31/IP54	I_e	A	700	750	1000	1200	1200	1700	1700
Impedance										
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.061	0.047	0.047	0.029	0.031	0.023	0.024
	Reactance	X_{20}	mΩ/m	0.052	0.043	0.043	0.03	0.031	0.023	0.030
	Impedance	Z_{20}	mΩ/m	0.079	0.064	0.064	0.041	0.043	0.033	0.038
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.072	0.054	0.057	0.035	0.036	0.027	0.028
	Reactance	X_1	mΩ/m	0.051	0.043	0.043	0.028	0.031	0.023	0.029
	Impedance	Z_1	mΩ/m	0.088	0.069	0.072	0.044	0.047	0.036	0.041
of the conducting paths for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.144	0.106	0.106	0.085	0.083	0.075	0.055
	Reactance	X_F	mΩ/m	0.167	0.178	0.178	0.113	0.117	0.109	0.115
	Impedance	Z_F	mΩ/m	0.218	0.207	0.207	0.147	0.144	0.132	0.128
Zero impedance										
for 4-pole systems acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.282	0.217	0.217	0.168	0.171	0.180	0.120
		X_0	mΩ/m	0.233	0.200	0.200	0.178	0.175	0.154	0.154
		Z_0	mΩ/m	0.367	0.295	0.295	0.249	0.244	0.237	0.195
Short-circuit rating										
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	55	70	80	110	110	125	125
	rms value t = 1 s	I_{cw}	kA	40	55	58	80	80	110	110
Rated impulse withstand current	Peak value	I_{pk}	kA	121	154	176	242	242	275	275
Conductor material				Aluminium						
No. of busbars				4	4	4	7	8	7	8
Conductor cross section	L1, L2, L3	A	mm²	530	706	706	1060	1060	1412	1412
	PEN	A	mm²	530	706	706	530	1060	706	1412
Fire load										
Trunking unit without tap-off point			KWh/m	7.08	7.09	7.09	10.87	11.99	10.87	11.99
per tap-off point			KWh	8.32	8.32	8.32	12.04	12.96	12.04	12.96
Max. fixing distances										
for conventional mechanical load			m	6	6	6	5	5	5	5

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

System-specific data				LDA641.	LDA642.	LDA741.	LDA742.	LDA841.	LDA842.
				PEN=½L	PEN=L	PEN=½L	PEN=L	PEN=½L	PEN=L
Rated current I_e[1]									
Horizontal/ edgewise [2]	IP34	I_e	A	3000	3000	3700	3700	4000	4000
	IP54	I_e	A	2000	2000	2400	2400	2700	2700
Vertical	IP34	I_e	A	2300	2300	2800	2800	3400	3400
	IP54	I_e	A	2000	2000	2400	2400	2700	2700
Horizontal/flat	IP31/IP54	I_e	A	1800	1800	2200	2200	2350	2350
Impedance									
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.024	0.017	0.016	0.015	0.013
	Reactance	X_{20}	mΩ/m	0.023	0.029	0.019	0.022	0.017	0.019
	Impedance	Z_{20}	mΩ/m	0.033	0.037	0.026	0.027	0.023	0.023
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.030	0.029	0.021	0.020	0.018	0.016
	Reactance	X_1	mΩ/m	0.024	0.029	0.019	0.022	0.017	0.019
	Impedance	Z_1	mΩ/m	0.038	0.041	0.029	0.030	0.025	0.025
of the conducting paths for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.075	0.056	0.055	0.041	0.049	0.038
	Reactance	X_F	mΩ/m	0.109	0.119	0.083	0.093	0.086	0.080
	Impedance	Z_F	mΩ/m	0.132	0.131	0.099	0.101	0.099	0.088
Zero impedance									
for 4-pole systems acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.180	0.120	0.126	0.090	0.110	0.075
		X_0	mΩ/m	0.154	0.153	0.097	0.119	0.086	0.087
		Z_0	mΩ/m	0.237	0.194	0.159	0.149	0.140	0.115
Short-circuit rating									
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286	286	286
Conductor material				Aluminium					
No. of busbars				7	8	7	8	7	8
Conductor cross section	L1, L2, L3	A	mm^2	1412	1412	2044	2044	2464	2464
	PEN	A	mm^2	706	1412	1022	2044	1232	2464
Fire load									
Trunking unit without tap-off point			KWh/m	10.87	11.99	10.87	11.99	10.87	11.99
per tap-off point			KWh	12.04	12.96	12.04	12.96	12.04	12.96
Max. fixing distances									
for conventional mechanical load			m	5	5	5	5	5	5

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

4.3.3 LDA.6.. trunking units (5-pole, aluminium)

System-specific data				LDA162.	LDA262.	LDA362.	LDA461.	LDA462.	LDA561.	LDA562.
				N=L	N=L	N=L	N=½L	N=L	N=½L	N=L
Rated current I_e [1]										
Horizontal/ edgewise [2]	IP34	I_e	A	1100	1250	1600	2000	2000	2500	2500
	IP54	I_e	A	900	1000	1200	1500	1500	1800	1800
Vertical	IP34	I_e	A	950	1100	1250	1700	1700	2100	2100
	IP54	I_e	A	900	1000	1200	1500	1500	1800	1800
Horizontal/flat	IP31/IP54	I_e	A	700	750	1000	1200	1200	1700	1700
Impedance										
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.061	0.048	0.048	0.030	0.030	0.023	0.025
	Reactance	X_{20}	mΩ/m	0.052	0.043	0.043	0.031	0.031	0.024	0.031
	Impedance	Z_{20}	mΩ/m	0.079	0.064	0.064	0.043	0.043	0.033	0.040
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.072	0.054	0.059	0.036	0.036	0.028	0.029
	Reactance	X_1	mΩ/m	0.051	0.043	0.042	0.031	0.031	0.024	0.031
	Impedance	Z_1	mΩ/m	0.088	0.069	0.072	0.047	0.047	0.037	0.042
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.162	0.108	0.108	0.109	0.109	0.092	0.084
	Reactance	X_F	mΩ/m	0.231	0.201	0.201	0.126	0.128	0.134	0.131
	Impedance	Z_F	mΩ/m	0.283	0.228	0.228	0.168	0.168	0.163	0.156
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.147	0.108	0.108	0.112	0.067	0.076	0.056
	Reactance	X_F	mΩ/m	0.197	0.173	0.173	0.108	0.109	0.106	0.114
	Impedance	Z_F	mΩ/m	0.246	0.204	0.204	0.155	0.128	0.130	0.127
Zero impedance										
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.310	0.240	0.240	0.250	0.250	0.217	0.213
		X_0	mΩ/m	0.415	0.200	0.200	0.235	0.235	0.202	0.265
		Z_0	mΩ/m	0.518	0.295	0.295	0.343	0.343	0.297	0.340
for 5-pole systems (N) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.293	0.231	0.231	0.267	0.146	0.181	0.121
		X_0	mΩ/m	0.260	0.219	0.219	0.144	0.144	0.128	0.167
		Z_0	mΩ/m	0.392	0.319	0.319	0.303	0.205	0.221	0.206
Short-circuit rating										
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	55	70	80	110	110	125	125
	rms value t = 1 s	I_{cw}	kA	40	55	58	80	80	110	110
Rated impulse withstand current	Peak value	I_{pk}	kA	121	154	176	242	242	275	275
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	33	42	48	66	66	75	75
	rms value t = 1 s	I_{cw}	kA	24	33	35	48	48	66	66
Conductor material				Aluminium						
No. of busbars				5	5	5	8	9	8	9
Conductor cross section	L1, L2, L3	A	mm^2	530	706	706	1060	1060	1412	1412
	N	A	mm^2	530	706	706	530	1060	6.73	1412
	PE	A	mm^2	530	706	706	530	530	706	706
Fire load										
Trunking unit without tap-off point			KWh/m	7.28	7.29	7.29	10.87	11.99	10.87	11.99
per tap-off point			KWh	8.32	8.32	8.32	12.04	12.96	12.04	12.96
Max. fixing distances										
for conventional mechanical load			m	6	6	6	5	5	5	5

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

System-specific data				LDA661.	LDA662.	LDA761.	LDA762.	LDA861.	LDA862.
				N=½L	N=L	N=½L	N=L	N=½L	N=L
Rated current I_e [1]									
Horizontal/edgewise [2]	IP34	I_e	A	3000	3000	3700	3700	4000	4000
	IP54	I_e	A	2000	2000	2400	2400	2700	2700
Vertical	IP34	I_e	A	2300	2300	2800	2800	3400	3400
	IP54	I_e	A	2000	2000	2400	2400	2700	2700
Horizontal/flat	IP31/IP54	I_e	A	1800	1800	2200	2200	2350	2350
Impedance									
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.023	0.017	0.018	0.014	0.015
	Reactance	X_{20}	mΩ/m	0.024	0.029	0.019	0.025	0.022	0.021
	Impedance	Z_{20}	mΩ/m	0.033	0.037	0.026	0.030	0.026	0.026
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.029	0.030	0.020	0.021	0.017	0.018
	Reactance	X_1	mΩ/m	0.024	0.031	0.020	0.025	0.021	0.021
	Impedance	Z_1	mΩ/m	0.037	0.043	0.028	0.033	0.027	0.027
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.092	0.084	0.068	0.065	0.055	0.056
	Reactance	X_F	mΩ/m	0.134	0.133	0.110	0.114	0.102	0.105
	Impedance	Z_F	mΩ/m	0.163	0.157	0.129	0.131	0.116	0.119
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.076	0.057	0.53	0.042	0.049	0.037
	Reactance	X_F	mΩ/m	0.106	0.113	0.080	0.091	0.084	0.086
	Impedance	Z_F	mΩ/m	0.130	0.127	0.096	0.100	0.097	0.094
Zero impedance									
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.217	0.212	0.163	0.166	0.145	0.146
		X_0	mΩ/m	0.202	0.263	0.175	0.220	0.196	0.196
		Z_0	mΩ/m	0.297	0.338	0.240	0.275	0.243	0.244
for 5-pole systems (N) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.181	0.122	0.130	0.089	0.115	0.079
		X_0	mΩ/m	0.128	0.155	0.102	0.093	0.095	0.100
		Z_0	mΩ/m	0.221	0.198	0.165	0.129	0.149	0.127
Short-circuit rating									
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	78	78	78	78	78	78
	rms value t = 1 s	I_{cw}	kA	70	70	70	70	70	70
Conductor material				Aluminium					
No. of busbars				8	9	8	9	8	9
Conductor cross section	L1, L2, L3	A	mm^2	1412	1412	2044	2044	2464	2464
	N	A	mm^2	706	1412	1022	2044	1232	2464
	PE	A	mm^2	706	706	1022	1022	1232	1232
Fire load									
Trunking unit without tap-off point			KWh/m	10.87	11.99	10.87	11.99	10.87	11.99
per tap-off point			KWh	12.04	12.96	12.04	12.96	12.04	12.96
Max. fixing distances									
for conventional mechanical load			m	5	5	5	5	5	5

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

4.3.4 LDC.4.. trunking units (4-pole, copper)

System-specific data				LDC242.	LDC342.	LDC641.	LDC642.
				PEN=L	PEN=L	PEN=½L	PEN=L
Rated current I_e[1]							
Horizontal/edgewise [2]	IP34	I_e	A	2000	2600	3400	3400
	IP54	I_e	A	1600	2000	2600	2600
Vertical	IP34	I_e	A	1650	2100	2700	2700
	IP54	I_e	A	1600	2000	2600	2600
Horizontal/flat	IP31/IP54	I_e	A	1200	1550	2000	2000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.030	0.026	0.015	0.015
	Reactance	X_{20}	mΩ/m	0.042	0.035	0.026	0.026
	Impedance	Z_{20}	mΩ/m	0.052	0.043	0.030	0.030
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.037	0.028	0.017	0.018
	Reactance	X_1	mΩ/m	0.042	0.036	0.026	0.027
	Impedance	Z_1	mΩ/m	0.056	0.046	0.031	0.032
of the conducting paths for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.075	0.056	0.048	0.037
	Reactance	X_F	mΩ/m	0.170	0.163	0.107	0.107
	Impedance	Z_F	mΩ/m	0.186	0.173	0.117	0.113
Zero impedance							
acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.144	0.114	0.116	0.079
		X_0	mΩ/m	0.199	0.225	0.124	0.130
		Z_0	mΩ/m	0.246	0.252	0.169	0.152
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	80	80	130	130
	rms value t = 1 s	I_{cw}	kA	58	58	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	176	176	286	286
Conductor material				Copper			
No. of busbars				4	4	7	8
Conductor cross section	L1, L2, L3	A	mm^2	706	1022	1412	1412
	PEN	A	mm^2	706	1022	706	1412
Fire load							
Trunking unit without tap-off point			KWh/m	7.09	7.09	10.87	11.99
per tap-off point			KWh	8.32	8.32	12.04	12.96
Max. fixing distances							
for conventional mechanical load			m	5	4	4	4

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

System-specific data				LDC741.	LDC742.	LDC841.	LDC842.
				PEN=½L	PEN=L	PEN=½L	PEN=L
Rated current I_e[1]							
Horizontal/edgewise [2]	IP34	I_e	A	4400	4400	5000	5000
	IP54	I_e	A	3200	3200	3600	3600
Vertical	IP34	I_e	A	3500	3500	4250	4250
	IP54	I_e	A	3200	3200	3600	3600
Horizontal/flat	IP31/IP54	I_e	A	2600	2600	3000	3000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.012	0.008	0.008	0.009
	Reactance	X_{20}	mΩ/m	0.023	0.021	0.021	0.018
	Impedance	Z_{20}	mΩ/m	0.026	0.024	0.022	0.020
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.012	0.013	0.011	0.011
	Reactance	X_1	mΩ/m	0.023	0.022	0.020	0.018
	Impedance	Z_1	mΩ/m	0.026	0.025	0.023	0.021
of the conducting paths for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.036	0.027	0.031	0.026
	Reactance	X_F	mΩ/m	0.090	0.086	0.073	0.080
	Impedance	Z_F	mΩ/m	0.097	0.090	0.079	0.085
Zero impedance							
acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.083	0.056	0.070	0.050
		X_0	mΩ/m	0.072	0.093	0.088	0.106
		Z_0	mΩ/m	0.109	0.109	0.113	0.118
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286
Conductor material				Copper			
No. of busbars				7	8	7	8
Conductor cross section	L1, L2, L3	A	mm^2	2044	2044	2464	2464
	PEN	A	mm^2	1022	2044	1232	2464
Fire load							
Trunking unit without tap-off point			KWh/m	10.87	11.99	10.87	11.99
per tap-off point			KWh	12.04	12.96	12.04	12.96
Max. fixing distances							
for conventional mechanical load			m	3	3	2	2

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

4.3.5 LDC.6.. trunking units (5-pole, copper)

System-specific data				LDC262.	LDC362.	LDC661.	LDC662.
				N=L	N=L	N=½L	PEN=L
Rated current I_e [1]							
Horizontal/edgewise [2]	IP34	I_e	A	2000	2600	3400	3400
	IP54	I_e	A	1600	2000	2600	2600
Vertical	IP34	I_e	A	1650	2100	2700	2700
	IP54	I_e	A	1600	2000	2600	2600
Horizontal/flat	IP31/IP54	I_e	A	1200	1550	2000	2000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.036	0.029	0.015	0.017
	Reactance	X_{20}	mΩ/m	0.043	0.037	0.027	0.027
	Impedance	Z_{20}	mΩ/m	0.056	0.047	0.031	0.032
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.037	0.031	0.017	0.018
	Reactance	X_1	mΩ/m	0.043	0.038	0.028	0.028
	Impedance	Z_1	mΩ/m	0.057	0.049	0.033	0.034
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.081	0.060	0.062	0.058
	Reactance	X_F	mΩ/m	0.204	0.186	0.139	0.124
	Impedance	Z_F	mΩ/m	0.220	0.195	0.153	0.137
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.078	0.059	0.048	0.037
	Reactance	X_F	mΩ/m	0.193	0.149	0.110	0.105
	Impedance	Z_F	mΩ/m	0.208	0.160	0.120	0.112
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.179	0.134	0.149	0.149
		X_0	mΩ/m	0.387	0.357	0.238	0.248
		Z_0	mΩ/m	0.426	0.381	0.281	0.289
for 5-pole systems (N) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.150	0.110	0.119	0.080
		X_0	mΩ/m	0.189	0.180	0.145	0.135
		Z_0	mΩ/m	0.241	0.211	0.187	0.157
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	80	80	130	130
	rms value t = 1 s	I_{cw}	kA	58	58	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	176	176	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	48	48	78	78
	rms value t = 1 s	I_{cw}	kA	35	35	70	70
Conductor material				Copper			
No. of busbars				5	5	8	9
Conductor cross section	L1, L2, L3	A	mm^2	706	1022	1412	1412
	N	A	mm^2	706	1022	706	1412
	PE	A	mm^2	706	1022	706	706
Fire load							
Trunking unit without tap-off point			KWh/m	7.29	7.29	10.87	11.99
per tap-off point			KWh	8.32	8.32	12.04	12.96
Max. fixing distances							
for conventional mechanical load			m	5	4	4	4

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

System-specific data				LDC761.	LDC762.	LDC861.	LDC862.
				N=½L	N=L	N=½L	N=L
Rated current I_e [1]							
Horizontal/edgewise [2]	IP34	I_e	A	4400	4400	5000	5000
	IP54	I_e	A	3200	3200	3600	3600
Vertical	IP34	I_e	A	3500	3500	4250	4250
	IP54	I_e	A	3200	3200	3600	3600
Horizontal/flat	IP31/IP54	I_e	A	2600	2600	3000	3000
Impedance							
of the conducting paths at 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.011	0.014	0.012	0.012
	Reactance	X_{20}	mΩ/m	0.023	0.021	0.018	0.020
	Impedance	Z_{20}	mΩ/m	0.025	0.025	0.022	0.023
of the conducting paths at 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.013	0.015	0.013	0.013
	Reactance	X_1	mΩ/m	0.024	0.022	0.020	0.020
	Impedance	Z_1	mΩ/m	0.027	0.027	0.024	0.024
of the conducting paths for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.048	0.050	0.045	0.048
	Reactance	X_F	mΩ/m	0.118	0.133	0.123	0.119
	Impedance	Z_F	mΩ/m	0.127	0.142	0.131	0.128
of the conducting paths for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.038	0.027	0.031	0.025
	Reactance	X_F	mΩ/m	0.092	0.089	0.082	0.079
	Impedance	Z_F	mΩ/m	0.100	0.093	0.088	0.083
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.116	0.100	0.103	0.103
		X_0	mΩ/m	0.186	0.216	0.188	0.184
		Z_0	mΩ/m	0.219	0.238	0.214	0.211
for 5-pole systems (N) acc. to DIN EN 60909-0/VDE 0102		R_0	mΩ/m	0.087	0.058	0.072	0.050
		X_0	mΩ/m	0.105	0.112	0.093	0.091
		Z_0	mΩ/m	0.137	0.126	0.118	0.104
Short-circuit rating							
Rated short-time withstand current	rms value t = 0.1 s	I_{cw}	kA	130	130	130	130
	rms value t = 1 s	I_{cw}	kA	116	116	116	116
Rated impulse withstand current	Peak value	I_{pk}	kA	286	286	286	286
Rated short-time withstand current of the 5th conductor	rms value t = 0.1 s	I_{cw}	kA	78	78	78	78
	rms value t = 1 s	I_{cw}	kA	70	70	70	70
Conductor material				Copper			
No. of busbars				8	9	8	9
Conductor cross section	L1, L2, L3	A	mm^2	2044	2044	2464	2464
	N	A	mm^2	1022	2044	1232	2464
	PE	A	mm^2	1022	1022	1232	1232
Fire load							
Trunking unit without tap-off point			KWh/m	10.87	11.99	10.87	11.99
per tap-off point			KWh	12.04	12.96	12.04	12.96
Max. fixing distances							
for conventional mechanical load			m	3	3	2	2

[1] Dependent upon degree of protection and laying method

[2] Incl. height rises ≤ 1.3 m

4.3.6 Feeder units

Connection units for non-Siemens distribution boards, recommended cross sections per conductor

	Recommended conductor cross-section per conductor [mm²]	Compatible LDA/LDC systems
LDA2420	CU 2 x 60 x 10	LDA142. and LDA242.
LDA2620	CU 2 x 60 x 10	LDA162. and LDA262.
LDA3420	CU 100 x 10	LDA342.
LDA3620	CU 100 x 10	LDA362.
LDA5410	CU 2 x 60 x 10	LDA441. and LDA541.
LDA5610	CU 2 x 60 x 10	LDA461. and LDA561.
LDA7410	CU 2 x 100 x 10	LDA641. and LDA741.
LDA7610	CU 2 x 100 x 10	LDA661. and LDA761.
LDA8410	CU 4 x 100 x 10	LDA841.
LDA8610	CU 4 x 100 x 10	LDA861.
LDA5420	CU 2 x 60 x 10	LDA442. and LDA542.
LDA5620	CU 2 x 60 x 10	LDA462. and LDA562.
LDA7420	CU 2 x 100 x 10	LDA642. and LDA742.
LDA7620	CU 2 x 100 x 10	LDA662. and LDA762.
LDA8420	CU 4 x 100 x 10	LDA842.
LDA8620	CU 4 x 100 x 10	LDA862.
LDC2420	CU 100 x 10	LDC241.
LDC2620	CU 100 x 10	LDC262.
LDC3420	CU 100 x 10	LDC342.
LDC3620	CU 100 x 10	LDC362.
LDC6410	CU 2 x 100 x 10	LDC641.
LDC6420	CU 2 x 100 x 10	LDC642.
LDC6610	CU 2 x 100 x 10	LDC661
LDC6620	CU 2 x 100 x 10	LDC662.
LDC7410	CU 4 x 100 x 10	LDC741.
LDC7420	CU 4 x 100 x 10	LDC742.
LDC7610	CU 4 x 100 x 10	LDC761.
LDC7620	CU 4 x 100 x 10	LDC762.
LDC8410	CU 4 x 120 x 10	LDC841.
LDC8420	CU 4 x 120 x 10	LDC842.
LDC8610	CU 4 x 120 x 10	LDC861.
LDC8620	CU 4 x 120 x 10	LDC862.

4.3.7 Tap-off units with fuse switch disconnector

Standards and regulations		IEC 60439-1 and -2, DIN EN 60439-1 and -2				
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30				
Degree of protection		IP30 standard, IP54 with retrofit kit				
Ambient temperature min./max./24-hour average	°C	–5/40/35				
Rated insulation voltage U_i acc. to IEC 60439-1, DIN EN 60439-1	V AC	400				
Overvoltage category/pollution degree		III/3				
Rated frequency	Hz	50 / 60 [1]				
Rated operating voltage U_e	V AC	400				
Typ LD-K-.AK./…….		31ST125	32ST125	3ST250	3ST400	3ST630
Fuse link		NH00	2 x NH00	NH1	NH2	NH3
Rated current I_e		125	2 x 125	250	400	630
Max. rated current I_{max} of the fuse	A	125	2 x 125	250	400	630
Max. permissible operating current $I_{r\,max}$ with IP 30	A	125	2 x 125	250	400	630
Max. permissible operating current $I_{r\,max}$ with IP 54	A	125	2 x 125	200	315	500
Switching capacity of the installed fuse switch disconnector acc to EN 60947-3		AC-22 B	AC-22 B	AC-22 B	AC-22 B	AC-22 B
Short-circuit rating with fuse protection (Icf) [2]		80	80	80	80	80
Cable entries - entry from the front without cable compartment - cable entry from the side with cable compartment						
Multi-core cable						
- Cable sleeves (KT 4) for cable diameters from 14 to 68 mm		2	2	2	2	3
Single-core cable		Aluminium plate, undrilled for cable glands 10 × M50				
Bolted connection		M8	M8	M10	M10	M10
- L1, L2, L3	mm	min. 1 x 10	min. 1 x 10	min. 1 x 25	min. 1 x 25	min. 1 x 25
	mm	max. 1 x 95	max. 1 x 95	max. 1 x 150	max. 2 x 240	max. 2 x 240
- N/PEN/PE	mm	min. 1 x 10	min. 1 x 10	min. 1 x 25	min. 1 x 25	min. 1 x 25
	mm	max. 1 x 95	max. 1 x 95	max. 1 x 150	max. 2 x 240	max. 2 x 240
Colour of tap-off units		RAL 7035, light grey				
Tap-off unit material		Sheet steel, zinc-plated and painted				
Weights	kg	33				

[1] In accordance with EN 60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

[2] Fuses: IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620

4.3.8 Tap-off units resistant to accidental arcs and with fuse switch disconnector

Standards and regulations		IEC 60439-1 and -2, DIN EN 60439-1 and -2	
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30	
Degree of protection		IP54, IP40 (Version KS)	
Ambient temperature min./max./24-hour average	°C	–5/40/35	
Rated insulation voltageU_i acc. to IEC 60439-1, EN 60439-1	V AC	400	
Overvoltage category/ pollution degree		III/3	
Rated frequency	Hz	50	
Rated operating voltage U_e	V AC	400	
Typ LD-K-.AK./…….		FSAM-400	FSAM-630
Rated current I_e	A	400	630
Max. rated current I_{max} of the fuse	A	400	630
Max. permissible operating current $I_{r\,max}$	A	400 [1]	540 [2]
Switching capacity of the installed fuse switch disconnector acc to EN 60947-3		AC-22 B	AC-22 B
Short-circuit rating with fuse protection (I_{cf}) [3]		110	110
Bushings			
Multi-core cable with add-on cable compartment for cable entry from the side		2 cable sleeves (KT 4) for cable diameters from 14 to 68 mm	2 cable sleeves (KT 4) for cable diameters from 14 to 68 mm
Single-core cable		Aluminium plate with 5x M50 cable glands for cable diameters 21-35mm	Aluminium plate with 5x M50 cable glands for cable diameters 21-35mm
Connection cross-sections (copper, bolted connection with cable lugs)			
- L1, L2, L3	mm	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240
- N/PEN/PE	mm	1 x 25 to 1 x 300/2 x 240	1 x 25 to 1 x 300/2 x 240
Colour of tap-off units		RAL 7035, light grey	
Tap-off unit material		Sheet steel, zinc-plated and painted	
Weights	kg	69	75

[1] For vertical installation of the tap-off units, a reduction by 5% is necessary (reduction factor 0.95)

[2] For vertical installation of the tap-off units, a reduction by 12 % is necessary (reduction factor 0.88)

[3] Fuses: IEC 269-1-2, NF EN 60269-1, NFC 63211, NFC 63210, VDE 0636-1, DIN 43620

4.3.9 Tap-off units with circuit-breaker

Size		**1**		**2**		**3**
Circuit breaker type		**VL160**	**VL250**	**VL400**	**VL630**	**VL1250**
General data						
Standards and regulations		IEC 60439-1 and -2, DIN EN 60439-1 and -2				
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30				
Degree of protection		IP54				
Ambient temperature min./max./24-hour average	°C	–5/40/35				
Overvoltage category/degree of pollution according to DIN EN 60439-1		III/3				
Rated insulation voltage U_i acc. to IEC 60439-1, EN 60439-1	V AC	400				
Rated operating voltage U_e	V AC	400				
Rated frequency	Hz	50/60 [2]				
Rated current I_e	A	100, 125, 160	200, 250	315, 400	630	800, 1000, 1250
Max. permissible operating current $I_{r\,max}$		100 [1], 125 [1], 160 [1]	200 [1], 250 [1]	315 [1], 400 [1]	580 [1]	800, 1000, 1250 [1]
Switching capacity of the circuit breaker		H (70 kA) or L (100 kA)				L (100 kA)
Rated conditional short-circuit current I_{cc} (values for 690 V on request)	kA	70 or 100				100
Current setting of overload release						
AE design	A	40 ... 100 64 ... 160	80 ... 200 100 ... 250	126 ... 315 160 ... 400	252 ... 630	400 ... 1000 500 ... 1250
DC, EC design	A	80 ... 100 100 ... 125 125 ... 160	160 ... 200 200 ... 250	215 ... 315 320 ... 400	500 ... 630	-

Size			**1**		**2**		**3**
Circuit breaker type			**VL160**	**VL250**	**VL400**	**VL630**	**VL1250**
Connections							
Bushings							
Multi-core cable							
- Cable sleeves			2 × KT 3		2 x KT 4		4 x KT 4
- Cable diameters		mm^2	14 ... 54		14 ... 68		
Single-core cable, undrilled aluminium plate, for cable glands			8 × M40		12 x M40		24 x M40
- Cable entry from the side			Yes		Yes		Yes
Conductor cross sections (copper)							
Connection system			Direct connection on the device		Tags		Cable connection system
Bolted connection			1 x M8	1 x M8	1 x M8	2 x M10 [3]	4 x M12 [4]
L1, L2, L3; N, PEN/PE	min.	mm^2	[1]	[1]	[1]	[1]	4 x (4) x 70
	max.	mm^2	[1]	[1]	[1]	[1]	4 x (4) x 240
Colour			Light grey (RAL 7035)				
Material			Sheet steel, zinc-plated/painted				
Weights		kg		37	58	61	107

[1] For "suspended, bottom" installation of the tap-off units, a reduction by 10% is necessary (reduction factor 0.9).

[2] In accordance with EN 60439-1, a reduction of 95% must be taken into account for currents > 800 A at a frequency of 60 Hz.

[3] For 2 cable lugs per conductor

[4] For 4 cable lugs per conductor

4.4 Weights

Trunking unit with aluminium conductors

The weights given are metre weights (kg/m) for trunking units without tap-off points in IP34 degree of protection. An additional 0.6 kg/m must be taken into account for IP54 protection. In the case of trunking units with tap-off points, an additional 7 kg per tap-off point must be taken into account.

	LDA1...	LDA2...	LDA3...	LDA4...	LDA5...	LDA6...	LDA7...	LDA8...
LDA.413	-	-	-	24.1	27.4	27.4	33.7	37.2
LDA.423	18.1	20.0	20.0	25.6	29.4	29.4	36.6	40.6
LDA.613	-	-		25.6	29.4	29.4	36.6	40.6
LDA.623	20.1	22.0	22.0	27.1	31.4	31.4	39.5	44.0

Trunking units with copper conductors

The weights given are metre weights (kg/m) for trunking units without tap-off points in IP34 degree of protection. In the case of trunking units with tap-off points, an additional 7 kg per tap-off point must be taken into account. An additional 0.6 kg/m must be taken into account for IP54 protection.

	LDC2...	LDC3...	LDC6...	LDC7...	LDC8...
LDC.413	-	-	60.3	82.0	100.2
LDC.423	38.8	51.2	67.0	91.8	112.6
LDC.613	-	-	67.0	91.8	112.6
LDC.623	45.5	61.0	73.7	101.6	125.0

4.5 Dimension drawings

4.5.1 Trunking units

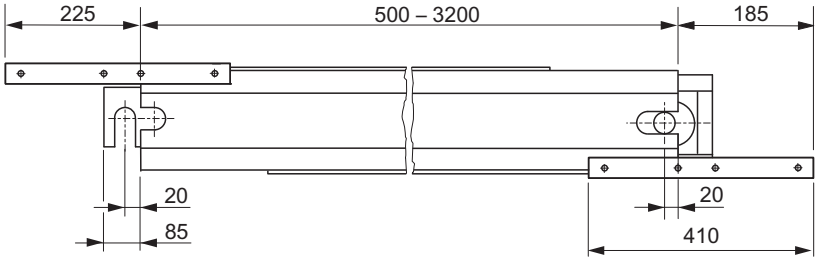


Figure 4-14 LDA(C)...-..., LDA(C)...-D-..., LDA(C)...-V-...

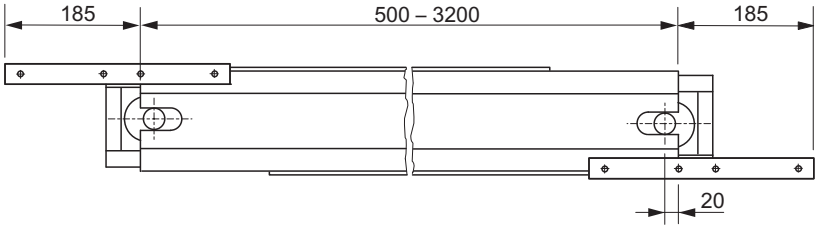
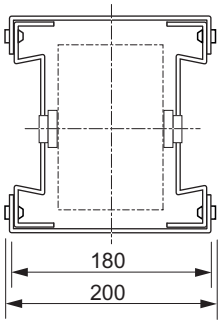
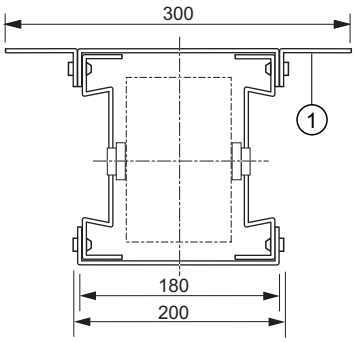


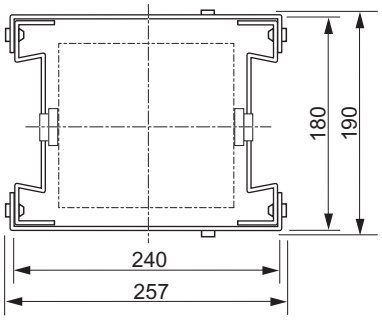
Figure 4-15 LDA(C)...-J-...



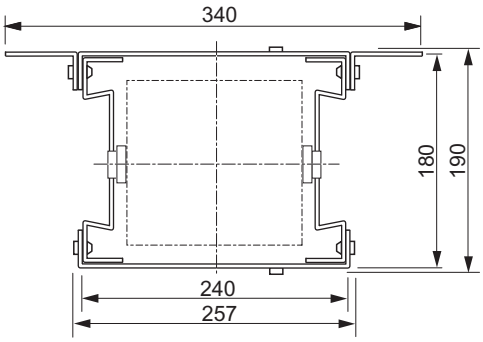
LDA(C)1... to LDA(C)3...



LDA(C)1...-K-... to LDA(C)3...-K-...
① Coding bracket (busbars with tap-off points only)

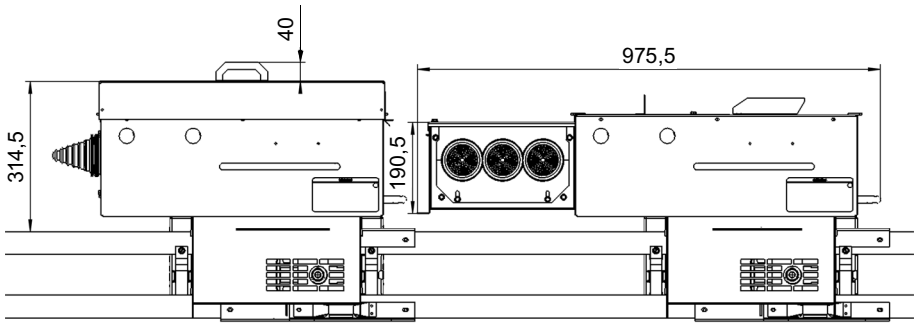


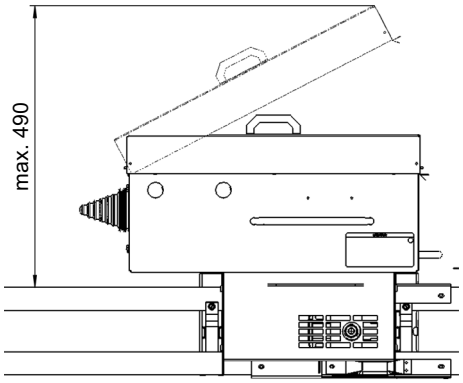
LDA(C)4... to LDA(C)8...



LDA(C)4...-K-... to LDA(C)8...-K-...

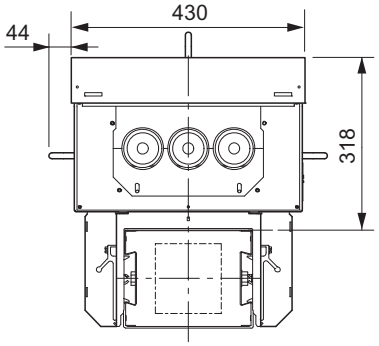
4.5.2 Tap-off units with fuse switch disconnector



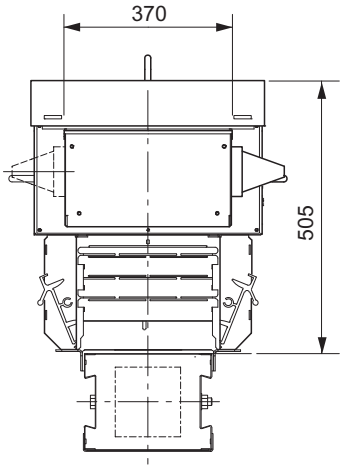


LD-K-.AK/.ST...
without cable compartment (cable entry from the front)

LD-K-.AK/.ST... +LD-KR
with cable compartment (cable entry from the side)



Tap-off unit mounted



Space requirements for mounting

4.5.3 Arc fault resistant tap-off units with fuse switch disconnector

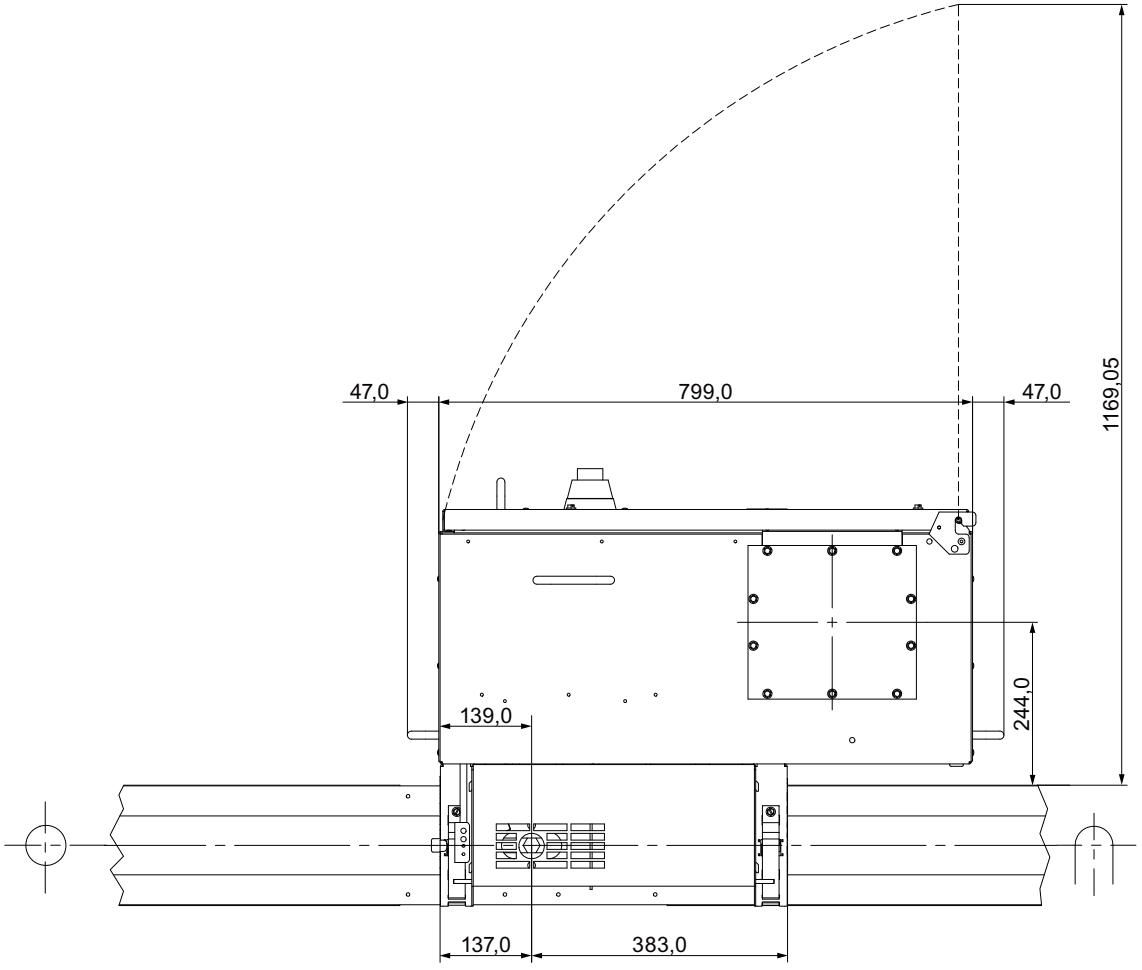
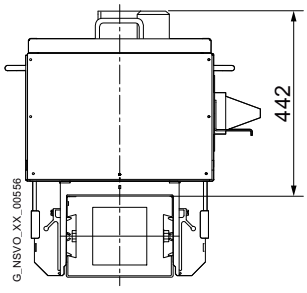
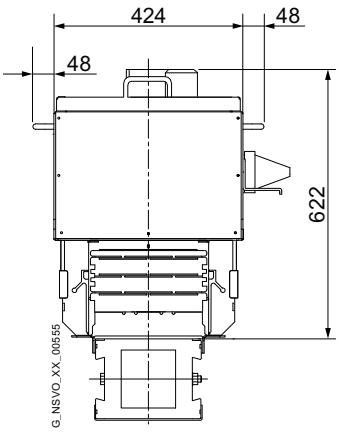


Figure 4-16 Tap-off units with fuse switch disconnector: LD-K-.AK./FSAM400(630)



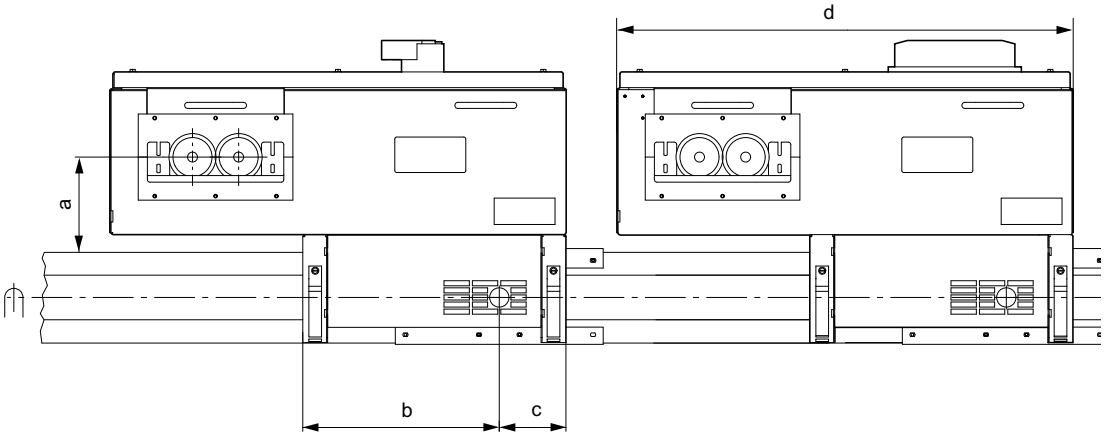
Tap-off unit mounted



Space requirements for mounting

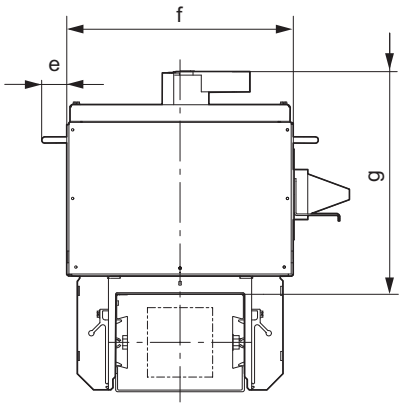
4.5.4 Tap-off units with circuit-breaker

Sizes up to 250 A and 400 A to 630 A

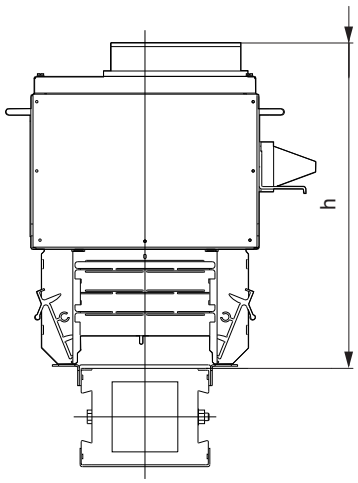


LD-K.AK./LSH-...-.

LD-K.AK/LSM-...-.



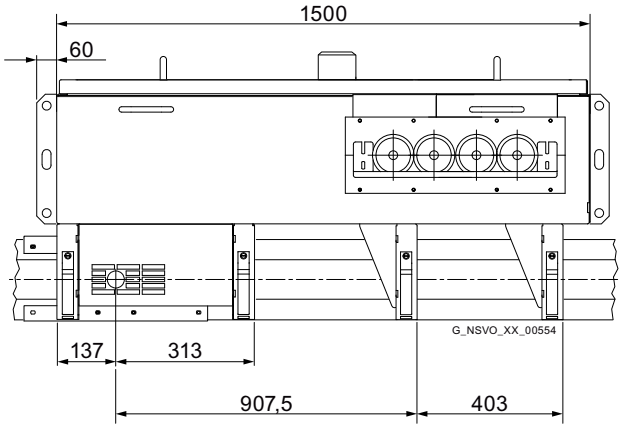
Tap-off unit mounted



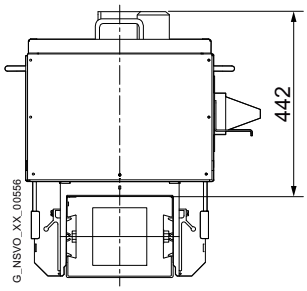
Space requirements for mounting

	a	b	c	d	e	f	g	h
Size 1	158	317.5	136.5	600	47	424		559
Size 2	187	387.5	136.5	900	47	424		604

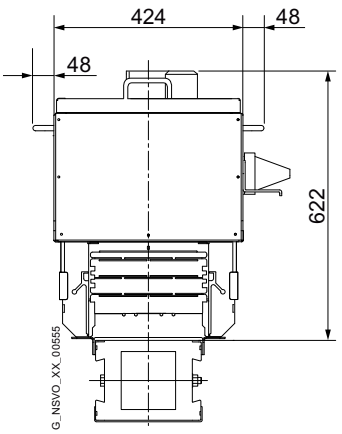
Sizes 800 A to 1250 A



LD-K.AK./LSH-.....-LS



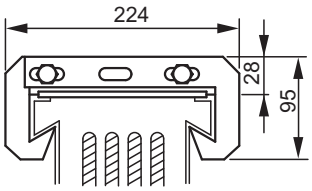
Tap-off unit mounted



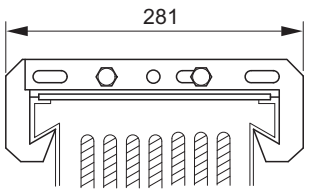
Space requirements for mounting

4.5.5 Additional equipment

Suspension bracket for horizontal mounting

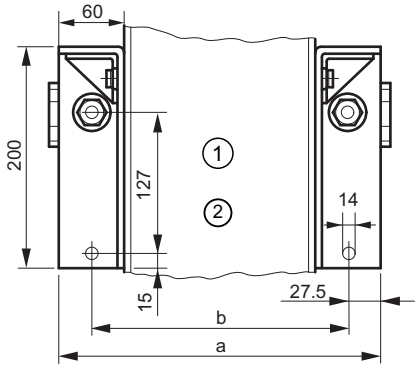


LD-B1

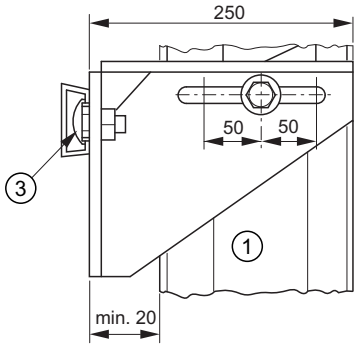


LD-B2

Fixing brackets for vertical mounting



LD-BV



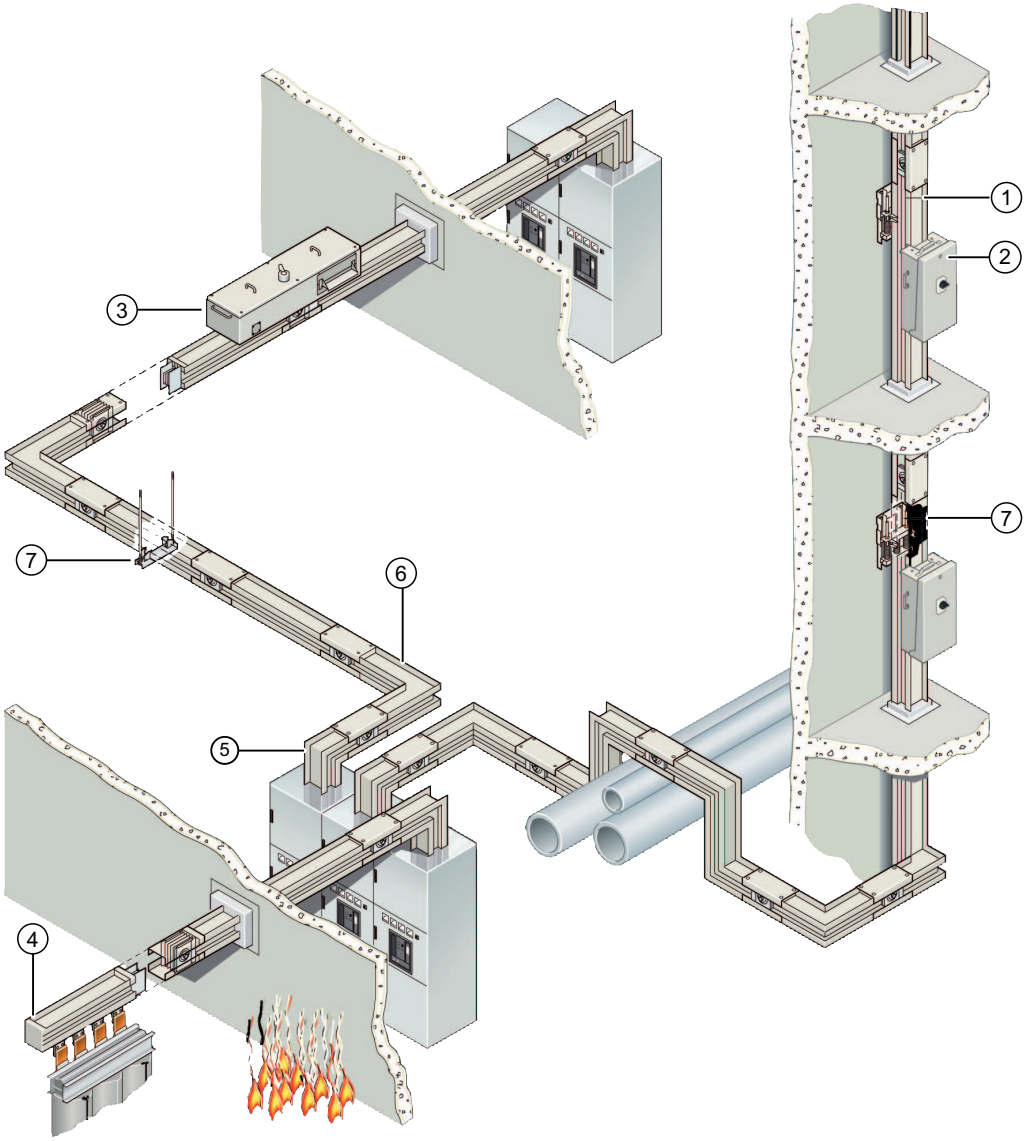
① LD system
② Front
③ Site

Type	a mm	b mm
LDA1 to LDA3	300	245
LDC2 to LDC3	300	245
LDA4 to LDA8	357	302
LDC6 to LDC8	357	302

Planning with LX

5

5.1 System description



① Straight trunking units (with or without tap-off points)
② Tap-off units
③ Junction boxes, permanently installed
④ Feeder units
⑤ Connection to Siemens power distribution boards
⑥ Junction units
⑦ Additional equipment for wall/ceiling mounting

Figure 5-1 Overview of LX busbar trunking systems

The LX busbar trunking system is used for both power transmission and distribution. The system is characterised by high flexibility as it is not tied to a specific position and is particularly suitable for power distribution in multi-storey buildings. The high degree of protection IP54 and IP55 [1], tap-off units up to 630 A and junction boxes up to 1250 A also ensure reliable power supply in industrial applications with high power requirements.

[1] IP55 on request

5.2 System components

5.2.1 Preliminary remark for specifications

Basic description busbar trunking systems 800 A to 6300 A [1]

Busbar trunking systems shall be supplied and installed as ready-to-use type-tested low-voltage switchgear assemblies (TTA).

The following descriptions are part of the costing and contracts process. They must be considered when specifying individual systems and equipment, even if they are not subsequently referred to in more detail.

The busbar trunking system has to be suitable for power transmission, e.g. between transformer and low-voltage main distribution board, and power distribution in the form of a power supply, as well as for horizontal and vertical installation.

The busbar trunking system must comprise standardized system components such as:

- Straight trunking units with and without tap-off points
- Feeder units for incoming transformer, distribution board and cable connection units
- Junction units with elbow, offset elbow, knee, offset knee, Z units and T units
- Tap-off units and junction boxes

All units must be available ex-works in standard lengths and optional lengths. It is not permitted to set up flexible junction units and junction units using cable connections. Expansion units and fixed points must be planned as per requirements.

Tap-off units/junction boxes are connected to the tap-off points on the trunking units as required. It must be possible to select the number and position of tap-off points. 10 tap-off points must be possible every 3 m. Tap-off units are protected against incorrect mounting. Depending on the type, the isolation of the tap-off units during removal is assured by a compulsory sequence of operations or by cautionary instructions.

The bolt-on junction boxes can only be mounted and removed at the tap-off joint blocks, and they must be secured against installation errors. Zero load during removal of both a plug-in tap-off unit and a bolt-on junction box must be ensured either through a compulsory sequence of operations or cautionary instructions.

If required, it must be possible to fit the busbar trunking system with an asbestos-free fireproof barrier for wall or ceiling mounting which is compliant with fire resistance class S120.

The enclosure consists of aluminium painted light grey (colour RAL 7035). The cross section of the trunking units must not exceed the dimensions specified in the technical data. The junction point between two trunking units must not protrude beyond the enclosure run.

The individual system components must be connected by screwing on a state-of-the-art bolted joint block.

The busbars must be made of aluminium or copper. The aluminium busbars are coated with nickel and tin [2)], and the copper busbars are coated with tin [2)]. The busbars are insulated along their entire length.

The conductor cross sections must not go below the values specified in the technical data.

The insulating material coating is made of Mylar and corresponds to a thermal class of 150 °C (RTE 130 acc. to IEC 60085; 2008).

The fire load must not exceed the value specified in the technical data.

[1)] On request

[2)] At the current transition points

Conformity and test certificates

The manufacturer of the busbar system must have in place and be able to prove compliance with a quality management system in accordance with EN/ISO 9001.

Proof of compliance with the following requirements must be provided for the entire system in the form of certificates or declarations of conformity:

- Type test acc. to DIN EN 60439-1/VDE 0660-500 and DIN EN 60439-2/VDE 0660-502
- Resistance to extreme climates acc. to IEC 60068-2-78 (constant) and IEC 60068-2-30 (cyclic)
- Fire protection acc. to DIN 4102-9
- Maintenance-free

Reliable proof of special additional characteristics (e.g. sprinkler test) of system components must be provided.

Technical data for busbar trunking systems

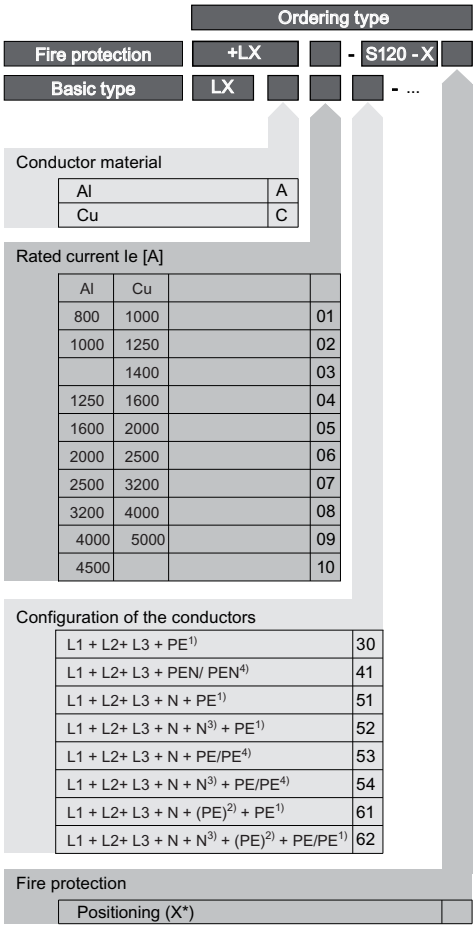
Ambient temperature min./max./24-hour average	–5/+40/35°C
Degree of protection	IP54, IP55 [1]
Torque for joint block	120 ± 10 Nm
Busbar surface treatment	Insulated along entire length
Trunking unit material	Painted aluminium casing
Colour of trunking units	RAL 7035 (light grey)
Rated insulation voltage U_i	1000 VAC
Rated operating voltage U_e	up to 690 V AC for power transmission up to 400 V AC for power distribution [3]
Rated frequency f	50 Hz
Rated current I_e	_____[2]
Rated short-time withstand current	
• External conductor I_{cw} (1 s)	_____[2]
• Neutral conductor I_{cw} (1 s)	_____[2]
• 5. conductor I_{cw} (1 s)	_____[2]
Rated peak withstand current I_{pk}	_____[2]
Conductor material	AL/CU[3]
No. of busbars	_____[2]
Conductor cross section	
• L1, L2, L3	_____[2]
• N	_____[2]
• PE (equivalent CU cross section)	_____[2]
• Clean earth	_____[2]
Fire loads	
• Trunking unit without tap-off point	_____[2]
• per tap-off point	2.9 kWh
Maximum fixing distances	
• Horizontal edgewise	_____[2]
• Horizontal flat	2 m
Enclosure dimensions	_____[2]

[1] On request
[2] Enter data for selected systems. See technical data for values.
[3] Please delete as appropriate.

5.2.2 Type code

The basic components of the LX system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material and system type or conductor configuration.

The resulting type code enables the required system to be precisely defined.



1) PE conductor = enclosure
2) Separate PE conductor routed through additionally insulated busbar (clean earth)
3) An additional busbar doubles the cross section of the neutral conductor (200%)
4) PE conductor = enclosure and additional busbar
5) Only available as a copper system (LXC)

Selection example:

A rated current of 2500 A is calculated for a project. Aluminium conductors shall be used. A 5-pole system has to be used. The cross section of the neutral conductor needs to be equal to the cross section of the phase conductor.

The following type is obtained:

LXA0751

5.2.3 System sizes and structure

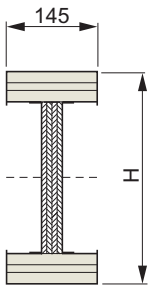
Sizes

Sizes are dependent upon rated current and conductor material. In total, there are six sizes. Four sizes are set up as single systems and two as double systems.

Single systems comprise one enclosure with between 3 and 6 aluminium or copper bars. Double systems have between 6 and 12 bars in two enclosures.

The precise number of bars is determined by the required conductor configuration.

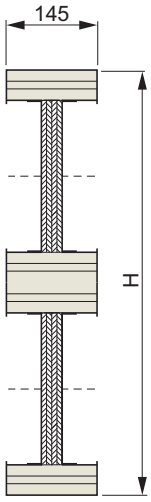
Sizes (H x W[1]), single system



Height H [mm]	System
137	LXA(C)01, LXA(C)02
162	LXC03, LXA(C)04
207	LXA(C)05
287	LXA(C)06, LXA(C)07

[1] Width is always 145 mm

Sizes (H x W[1]), double system

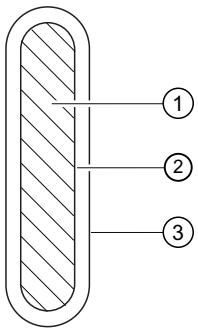


Height H [mm]	System
439	LXA(C)08
599	LXA(C)09, LXA10

[1] Width is always 145 mm

Structure of the busbars

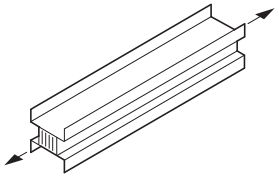
The bars in the LX busbar system are tinned at the current transfer points and enclosed in a sleeve made of highly resistant insulating material. LXA systems feature aluminium conductors and LXC systems copper conductors. In addition to tinning, aluminium bars are also coated with a layer of nickel.



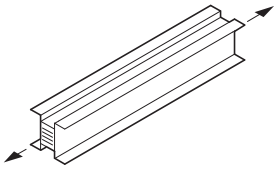
① Aluminium bar (LXA), copper bar (LXC)
② Layer of nickel, layer of tin (LXA), layer of tin (LXC)
③ Insulating material sleeve with high heat resistance

Mounting positions and rated current

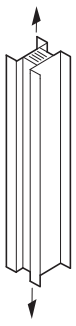
The sandwich construction means that the current carrying capacity of the LX busbar system is not affected by the mounting position. This guarantees high flexibility for positioning the busbar runs. Current derating is almost never required for busbars in edgewise and flat positions on horizontal busbar runs or on rising main busbars (vertical busbar runs). You can find details of the relevant system variables in the technical data.



Horizontal busbar run, edgewise busbars



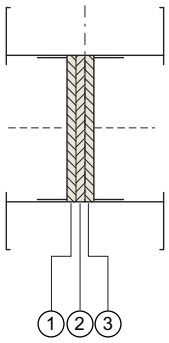
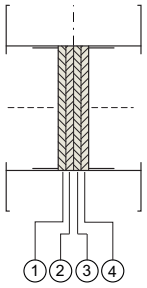
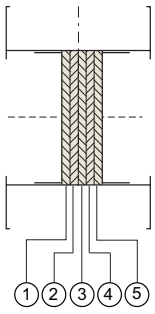
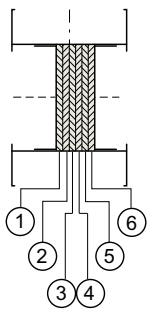
Horizontal busbar run, flat busbars



Vertical busbar run

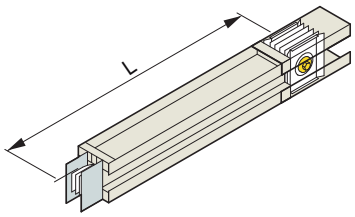
5.2.4 Conductor configuration

The LX busbar system is available with eight different conductor configurations dependent upon system type, the size of the N and PE cross sections as well as whether or not an additional insulated PE conductor (clean earth) has been included.

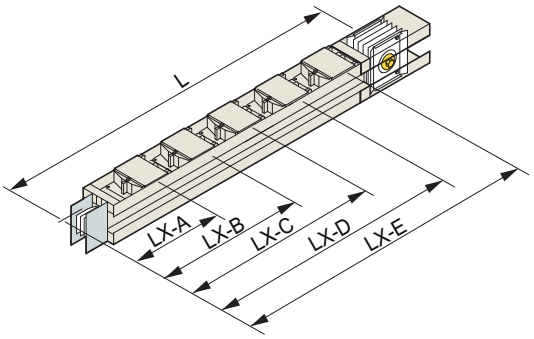
	System	Conductor configurations						Enclosure
		①	②	③	④	⑤	⑥	
	LX...30	L1	L2	L3	-	-	-	is the PE conductor
	LX...41	L1	L2	L3	PEN	-	-	Electrical connection between enclosure and PEN
	LX...51	L1	L2	L3	N	-	-	is the PE conductor
	LX...52	L1	L2	L3	N	N	-	is the PE conductor
	LX...53	L1	L2	L3	N	PE	-	Electrical connection between enclosure and PE
	LX...61	L1	L2	L3	N	Clean earth	-	is the PE conductor
	LX...54	L1	L2	L3	N	N	PE	Electrical connection between enclosure and PE
	LX...62	L1	L2	L3	N	N	Clean earth	is the PE conductor

5.2.5 Straight trunking units

Straight trunking units for horizontal and vertical installation



Without tap-off points



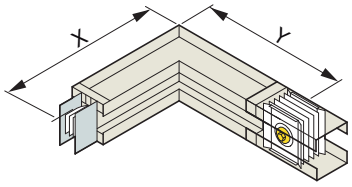
With tap-off points

	Length	Type
Standard lengths	1 m	LX.....-1
	2 m	LX.....-2
	3 m	LX.....-3
Optional lengths	0.35...0.99 m	LX.....-1W*
	1.01...1.99 m	LX.....-2W*
	2.01...2.99 m	LX.....-3W*
Standard lengths with up to 10 tap-off points	3 m	LX.....-3-ADO-U+LX-A(B, C, D, E) 2, 4, 6, 8 or 10 tap-off points can be selected on both sides
		LX.....-3-AD+LX-A(B, C, D, E) 1, 2, 3, 4 or 5 tap-off points can be selected on one side
	2 m	LX.....-2-1AD 1 tap-off point
Optional lengths with 1 tap-off point	1.50...2.00 m	LX.....-1W*-1AD
	2.01...2.50 m	LX.....-2W*-1AD
	2.51...3.00 m	LX.....-3W*-1AD

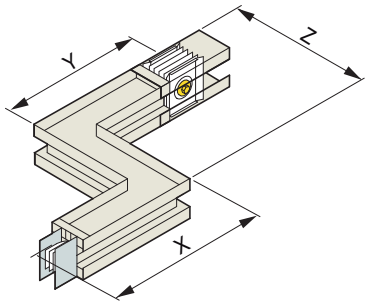
W = optional length
* = length in m
AD Tap-off point

5.2.6 Junction units

Junction units for horizontal installation



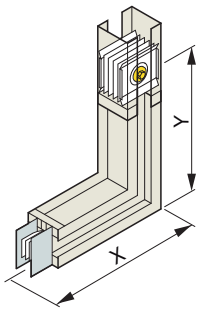
Angle LX.....-L-X*/Y*



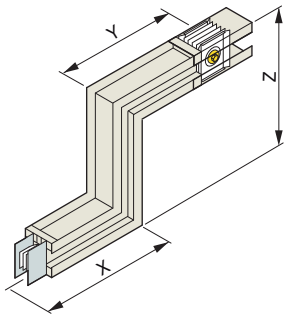
Z unit LX.....Z-X*/Y*/Z*

Length	System	Type
X = 0.35...1.20 m Y = 0.35...1.20 m	LX.01 to LX.10	LX.....-L-X*/Y*
X/Y = 0.35...0.70 m Z = 0.40...0.70 m	LX.01 to LX.10	LX.....-Z-X*/Y*/Z*

Junction units for horizontal and vertical installation



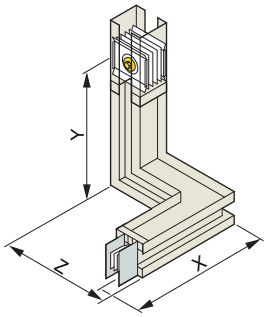
Knee LX.....-L-X*/Y*



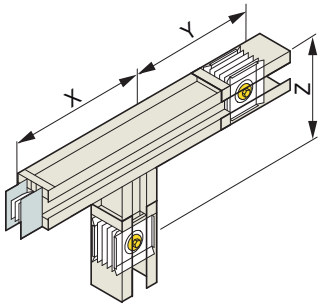
Z unit LX.....-Z-X*/Y*/Z*

Length	System	Type
X/Y = 0.35...1.20 m	LX.01 to LX.04	LX.....-L-X*/Y*
X/Y = 0.50...1.30 m	LX.05 to LX.07	
X/Y = 0.80...1.60 m	LX.08 to LX.10	
X/Y = 0.35...0.70 m Z = 0.40...0.70 m	LX.01 to LX.04	LX.....-Z-X*/Y*/Z*
X/Y = 0.50...0.85 m Z = 0.70...1.00 m	LX.05 to LX.07	
X/Y = 0.80...1.15 m Z = 1.33...1.60 m	LX.08 to LX.10	

* Optional length in m



Offset knee LX.....-L-X*/Y*/Z*



T unit LX.....-T-X*/Y*/Z*

Length	System	Type
X/Y = 0.35...0.70 m Z = 0.40...0.70 m	LX.01 to LX.04	LX.....-L-X*/Y*/Z*
X/Y = 0.50...0.85 m Z = 0.52...0.85 m	LX.05 to LX.07	
X/Y = 0.80...1.15 m Z = 0.84...1.15 m	LX.08 to LX.10	
X/Y/Z = 0.35...0.70 m	LX.01 to LX.04	LX.....-T-X*/Y*/Z*
X/Y = 0.50...0.85 m	LX.05 to LX.07	
X/Y = 0.80...1.15 m	LX.08 to LX.10	

5.2.7 Distribution link for Siemens power distribution boards

Connection to power distribution systems as type-tested low-voltage switchgear assembly (TTA) compliant with DIN EN 60439-1 and DIN EN 60439-2

The distribution board and LX busbar trunking system are connected using an integrated busbar trunking connection unit for rated currents up to 6300 A [1]. This busbar connection can be made from above or below, thus ensuring a flexible connection. The connection provided between the power distribution system and the SIVACON 8PV, 8PT, S4 and S8 busbar trunking systems offer a high short-circuit rating that is type-tested to ensure a high level of safety in power transmission.

[1] Ie = 6300 A on request

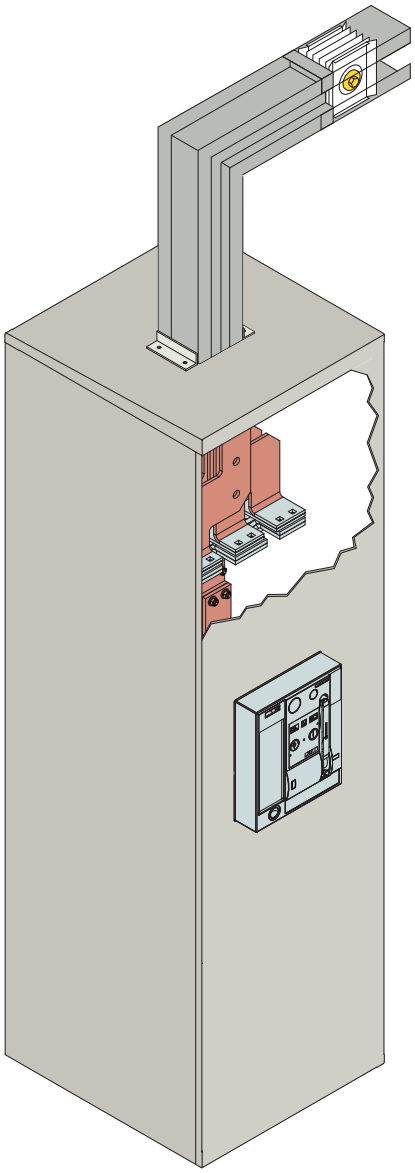


Figure 5-2 Distribution board link

5.2.8 Connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using an LX connection unit for non-Siemens distribution boards .... . The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Versions

Depending on system type, a total of eight different conductor configurations are available for selection. The rated currents up to a maximum of 5000 A correspond to the data in the Technical data section. In accordance with DIN EN 60439-1 and DIN EN 60439-2, the temperature limit in distribution systems in the event of heat rise must not be exceeded by the current heat. The limit temperature of the busbars, which are enclosed in insulating material, is 135 °C. The required conductor cross sections for the copper connections are also listed in Chapter Technical data (Page 173).

Installing the connection unit

The connections in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit rating is achieved and the permissible temperature limit of the non-Siemens connection unit is not exceeded.

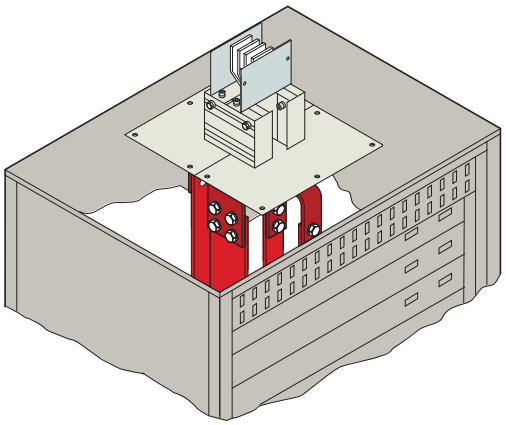


Figure 5-3 Connection unit for non-Siemens distribution boards

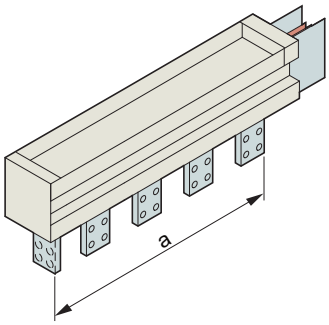
5.2.9 Connection unit for transformers and distribution boards

The wide variety of transformer types reflects the variety of rated currents and the different phase sequences and clearances.

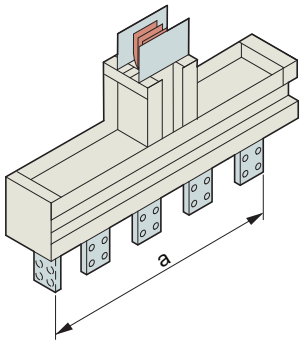
This type variety requires high flexibility as regards transformer connection in busbar trunking systems.

The universal connection unit can also be used to connect distribution boards.

For LX busbar trunking systems up to 5000 A, transformer connection units are available with busbar connection on the side (LX.....-AS.) and on the top (LX.....-AS.-T.).



Busbar connection on the side



Busbar connection on the top

a The total length is calculated from the phase clearances of the connection units to be planned (approx. 3 x phase clearance + 300 mm)

Type of connection unit	Selectable phase clearance	Possible phase sequences
LX.....-AS1(-T)	115...400 mm	L1, L2, L3, N (PEN) N (PEN), L3, L2, L1 L3, L2, L1, N (PEN) N (PEN), L1, L2, L3
LX.....-AS3(-T)	405...750 mm	
LX.....-AS2(-T)	450...750 mm	L1, L2, N (PEN), L3 L3, N (PEN), L2, L1 L3, L2, N (PEN), L1 L1, N (PEN), L2, L3

5.2.10 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an LXA(C)....-KE incoming cable connection unit.

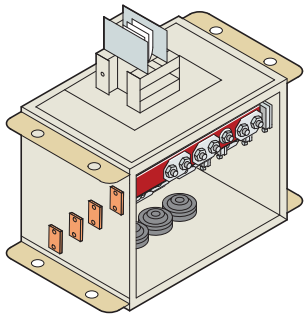


Figure 5-4 Incoming cable connection unit

The incoming cable connection unit is designed for rated currents from 800 to 3200 A.

Enclosure sizes

Depending on the system, three sizes can be selected:

Size 1:	LX.01...-KE to LXC02...-KE
Size 2:	LX.03...-KE and LXC(A)05...-KE
Size 3:	LX.06...-KE and LXC07..-KE

The maximum dimensions are 920 mm x 639 mm x 490 mm (W x H x D).

You can connect single-core or multi-core cables. You can connect cross sections up to 300 mm^2 (bolted connection) directly to the incoming cable connection unit bars.

The sheet steel flange plates and the cable sleeves are included in the scope of supply of the standard product. Single-core cables are supplied with an undrilled aluminium plate for cable entry.

5.2.11 Tap-off units and junction boxes

5.2.11.1 General information

Features of the tap-off units and junction boxes

For a comprehensive power distribution structure, tap-off units are available in three sizes and junction boxes in one size:

- Tap-off units for 80 to 250 A
- Tap-off units for 400 A
- Tap-off units for 630 A
- Junction boxes for 800 to 1250 A

The rated operating voltage (U_e) is 400 V. Regardless of the mounting position, the enclosure ensures IP54 degree of protection (IP55 can be achieved with the appropriate accessories) [1]. All units are fitted with either a fuse switch disconnector or circuit breaker with handle as well as bolts for the cable connection. For conductor systems (conductor configurations according to type LX...6.) with insulated PE conductor, the tap-off units are supplied with the addition of a separate PE connection.

[1] On request

Cable entry

Cable entry can be from the side or front (exception: for tap-off units up to 250 A from the front only). Integrated flange with cable sleeves facilitates multi-core cable entry. Aluminium plates are used for single-core cable entry; these have to be fitted with cable glands locally.

Safety during operation

The tap-off units cannot be opened unless the protective device is switched off manually. Once this is done, the cable connection area is no longer energized. The part of the contact device in the front of the tap-off unit is "finger-proof".

Implementing the tap-offs

Tap-offs are required for different amperages depending on the sizeand type of consumers involved. These are implemented by means of plug-in tap-off units from 80 to 630 A or junction boxes from 800 to 1250 A.

5.2.11.2 Tap-off units

Tap-off units from 80 to 630 A

- There are basically two different assembly variants: Fuse switch disconnectors or circuit breakers
- Power tap-off via tap-off point
- Anti-rotation feature prevents incorrect mounting.
- IP20 touch protection whilst the unit is being connected to the tap-off point

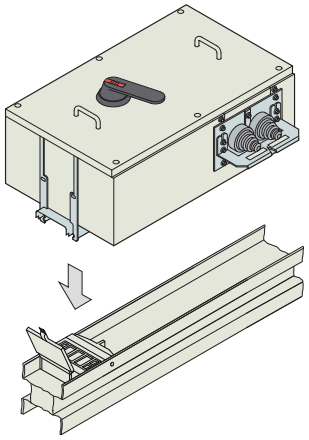


Figure 5-5 Tap-off unit

Note

Hot plugging

In accordance with DIN EN 50110-1 (VDE 0105-1), national regulations must be observed. Country-specific regulations may prohibit plugging when the busbar run is not switched off and energized with electrical power.

5.2.11.3 Tap-off units

Tap-off units from 800 to 1250 A

- Assembly with circuit breaker
- The system must be voltage-free before the junction box can be installed
- Power tap-off via joint block
- Anti-rotation feature prevents incorrect mounting.

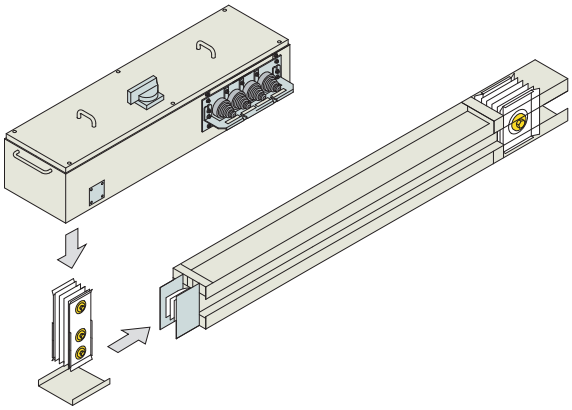


Figure 5-6 Tap-off units for permanent installation

5.2.11.4 Tap-off units with fuse switch disconnector up to 630 A

Rated currents

Plug-in tap-off units in three sizes are available for selection:

- For 125 to 250 A
- For 400 A
- For 630 A

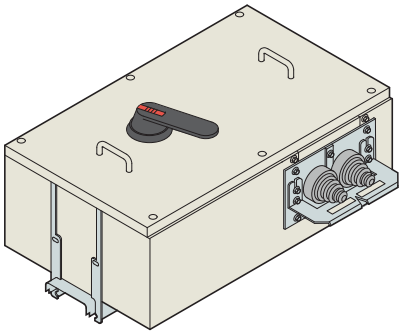


Figure 5-7 Tap-off units with fuse switch disconnector up to 630 A

Short-circuit rating

If you are using fuse links compliant with IEC standard the short-circuit rating I_{cf} of the tap-off units will be 100 kA (BS standard: 80 kA).

Assembly components

The fuse switch disconnectors are available for fuses compliant with IEC or BS standard and can be supplied as 3-pole or 4-pole units.

Cable connections

Bolts are used to connect cables with pre-fabricated cable lug. For the small size the maximum compatible cross section per phase is up to 150 mm^2, for the other sizes it is 2 x 120 mm^2 up to a maximum of 1 x 240 mm^2.

IEC/BS type designation

The type designation for tap-off units with fuse switch disconnector up to 630 A is:
LK-AK./FSH-.....

5.2.11.5 Tap-off units with circuit breaker up to 630 A and junction boxes with circuit breakers up to 1250 A

Rated currents

Tap-off units in two sizes are available for selection:

- For 125 to 250 A
- For 400 to 630 A

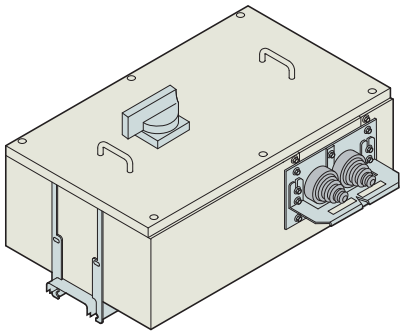


Figure 5-8 Tap-off units from 125 A to 630 A

The junction boxes are supplied in a standard size for 800 A, 1000 A and 1250 A.

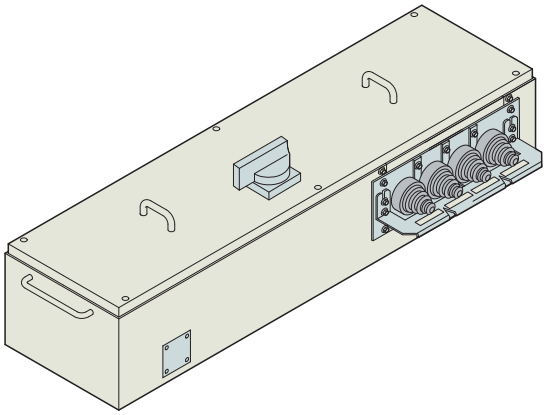


Figure 5-9 Junction boxes from 800 A to 1250 A

Short-circuit rating

When using circuit breakers with high switching capacity, the conditional short-circuit rating Icc of the tap-off units is 65 kA for the small and medium sizes and 85 kA for the large size.

Assembly components

The circuit breakers have a high switching capacity and can be set up with 3 or 4 poles.

Cable connection

Bolts are used to connect cables with pre-fabricated cable lug. For the small size, the maximum compatible cross section per phase is up to 35 mm2, for the three medium sizes it is 2 x 70 mm2, 2 x 120 mm2 up to a maximum of 2 x 240 mm2 and for the junction boxes it is up to 4 x 240 mm2.

Type designation

The type designation for tap-off units with circuit breaker is: LX-AK./LS.-.....

5.2.12 Additional equipment

End caps

If a busbar busbar run is not to continue to another distribution board, you will need to fit an end cap.

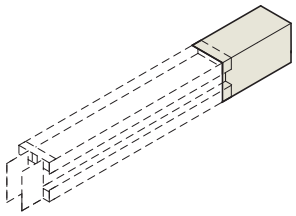


Figure 5-10 End cap

Joint block

If a busbar run is located between two incoming supplies (e.g. distribution boards, transformers, generators or incoming cable connection units), an additional joint block will need to be used.

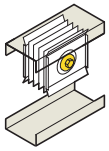


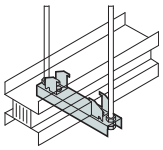
Figure 5-11 Joint block

Fixing brackets for horizontal installation

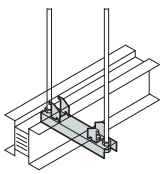
Two different fixing brackets are available:

- LX-BH type for horizontal edgewise mounting
- LX-BF type for horizontal flat mounting

Two LX-K type terminal clamps support the busbar trunking system on the fixing bracket. The terminal clamps and rail are supplied with the fixing bracket.



LX...-BH



LX...-BF

Fixing brackets for vertical installation

Special spring brackets have to be used to install vertical busbar runs.

- LX.....-BV1 type for power transmission
- LX.....-BV1-AK type for power distribution

The LX.....-BV1-AK type carries the additional own weight of at least one tap-off unit per floor at a floor height of between 3.40 m and 3.90 m.

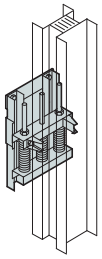


Figure 5-12 LX...-BV1, LX...-BV1-AK

5.3 Technical data

5.3.1 LX general data

Standards and regulations		IEC 60439-1 and -2, DIN EN 60439-1 and -2
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30
Ambient temperature	°C	–5/+40/+35 (min./max./24-hour average)
Degree of protection		IP54, IP55 on request
Torque for joint block (re-use)	Nm	120 ± 10
Busbar surface treatment		Insulated along the entire length Aluminium nickel-coated and tinned current transitions Copper tinned at the current transitions Current transitions at the tap-off points silver-coated
Trunking unit material		Painted aluminium casing
Colour of trunking units		RAL 7035 (light grey)
Dimensions		See Chapter Dimension drawings (Page 206)
Rated insulation voltage U_i trunking units acc. to DIN EN 60439-1 for power transmission for power distribution	 V AC V AC	 1000 690
Overvoltage category/ pollution degree		III/3 acc. to EN 60947
Rated operating voltage U_e for power transmission for power distribution	 V AC V AC	 690 400
Rated frequency	Hz	50

Adaptation of the rated current depending on the ambient temperature

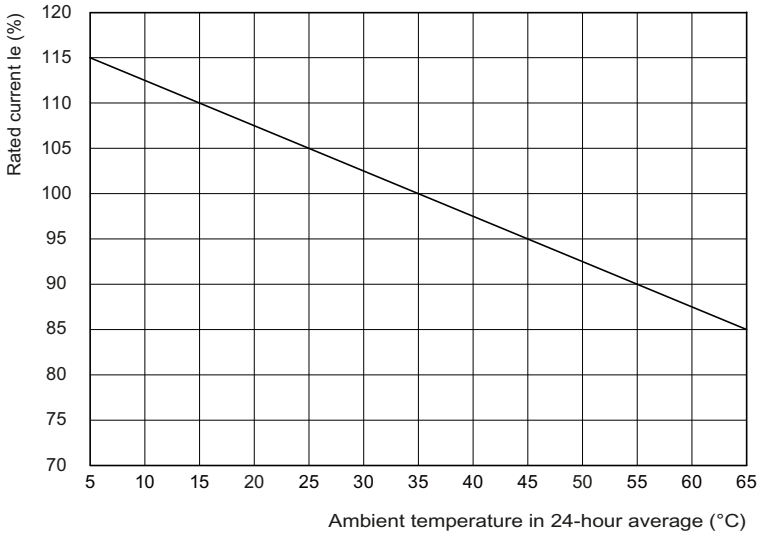


Figure 5-13 Rated current and ambient temperature

5.3.2 Trunking units LXA..30 (aluminium)

System-specific data			LXA	0130	0230	0430	0530	0630
Rated current		I_e	A	0800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.035
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.07	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.029
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.223	0.214	0.180	0.116	0.110
	Reactance	X_F	mΩ/m	0.140	0.139	0.114	0.095	0.071
	Impedance	Z_F	mΩ/m	0.263	0.255	0.213	0.150	0.131
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.434	0.473	0.428	0.275	0.277
		X_0	mΩ/m	0.363	0.354	0.293	0.250	0.195
		Z_0	mΩ/m	0.566	0.591	0.519	0.372	0.338
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated peak withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				3	3	3	3	3
Conductor cross section	L1, L2, L3	A	mm^2	292	386	586	946	1192
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1135	1348
Weights			kg/m	9.6	10.6	13.3	17.8	21.8

System-specific data			LXA	0730	0830	0930	1030
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.009	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.025	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.015
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.108	0.086	0.062	0.065
	Reactance	X_F	mΩ/m	0.077	0.071	0.045	0.044
	Impedance	Z_F	mΩ/m	0.133	0.112	0.077	0.078
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.278	0.223	0.158	0.172
		X_0	mΩ/m	0.209	0.195	0.125	0.108
		Z_0	mΩ/m	0.348	0.296	0.202	0.203
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated peak withstand current	Peak value	I_{pk}	kA	194	220	225	255
Conductor material				Aluminium			
No. of busbars				3	6	6	6
Conductor cross section	L1, L2, L3	A	mm^2	1586	1892	2384	3172
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	2270	2694	2696
Weights			kg/m	26.3	35.5	43.4	52.1

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

5.3.3 Trunking units LXA..41 (aluminium)

System-specific data			LXA	0141	0241	0441	0541	0641
Rated current		I_e	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.029
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.070	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.035
for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.172	0.135	0.095	0.061	0.047
	Reactance	X_F	mΩ/m	0.074	0.083	0.064	0.050	0.032
	Impedance	Z_F	mΩ/m	0.188	0.158	0.114	0.079	0.057
Zero impedance								
for 4-pole systems acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.283	0.237	0.172	0.110	0.088
		X_0	mΩ/m	0.132	0.133	0.101	0.080	0.047
		Z_0	mΩ/m	0.313	0.272	0.199	0.136	0.100
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated peak withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				4	4	4	4	4
Conductor cross section	L1, L2, L3	A	mm^2	292	386	586	946	1192
Equivalent copper cross section	PEN	A	mm^2	1109	1161	1341	1657	2006
Weights			kg/m	10.6	12.0	15.2	20.8	25.6

System-specific data			LXA	0741	0841	0941	1041
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.008	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.026	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.015
for 4-pole systems under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.041	0.032	0.025	0.020
	Reactance	X_F	mΩ/m	0.035	0.032	0.018	0.018
	Impedance	Z_F	mΩ/m	0.054	0.045	0.031	0.027
Zero impedance							
for 4-pole systems acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.077	0.061	0.047	0.038
		X_0	mΩ/m	0.057	0.050	0.026	0.026
		Z_0	mΩ/m	0.096	0.079	0.053	0.046
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated peak withstand current	Peak value	I_{pk}	kA	194	220	255	255
Conductor material				Aluminium			
No. of busbars				4	8	8	8
Conductor cross section	L1, L2, L3	A	mm^2	1586	1892	2384	3172
Equivalent copper cross section	PEN	A	mm^2	2223	3314	4011	4446
Weights			kg/m	31.3	42.0	51.3	63

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

5.3.4 Trunking units LXA..51 (aluminium)

System-specific data			LXA	0151	0251	0451	0551	0651
Rated current		I_e	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.029
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.070	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.035
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.223	0.214	0.180	0.116	0.110
	Reactance	X_F	mΩ/m	0.140	0.139	0114	0.095	0.071
	Impedance	Z_F	mΩ/m	0.263	0.253	0.213	0.150	0.031
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.249	0.192	0.133	0.086	0.064
	Reactance	X_F	mΩ/m	0.113	0.122	0.095	0.072	0.046
	Impedance	Z_F	mΩ/m	0.273	0.227	0.163	0.112	0.079
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.434	0.473	0.428	0.275	0.277
		X_0	mΩ/m	0.363	0.354	0.293	0.250	0.195
		Z_0	mΩ/m	0.566	0.591	0.519	0.372	0.338
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.484	0.377	0.260	0.167	0.128
		X_0	mΩ/m	0.175	0.177	0.134	0.095	0.061
		Z_0	mΩ/m	0.515	0.417	0.293	0.192	0.142
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				4	4	4	4	4
Conductor cross section	L1, L2, L3	A	mm^2	292	386	586	946	1192
	N	A	mm^2	292	386	586	946	1192
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1135	1348
Weights			kg/m	10.6	12.0	15.2	20.8	25.6

System-specific data			LXA	0751	0851	0951	1051
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.009	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.025	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.015
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.108	0.086	0.062	0.065
	Reactance	X_F	mΩ/m	0.077	0.071	0.045	0.044
	Impedance	Z_F	mΩ/m	0.133	0.112	0.077	0.078
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.055	0.047	0.032	0.028
	Reactance	X_F	mΩ/m	0.047	0.043	0.023	0.023
	Impedance	Z_F	mΩ/m	0.072	0.064	0.039	0.036
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.278	0.223	0.158	0.172
		X_0	mΩ/m	0.209	0.195	0.125	0.108
		Z_0	mΩ/m	0.348	0.296	0.202	0.203
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.106	0.095	0.062	0.052
		X_0	mΩ/m	0.065	0.060	0.030	0.030
		Z_0	mΩ/m	0.125	0.112	0.069	0.060
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated peak withstand current	Peak value	I_{pk}	kA	194	220	255	255
Conductor material				Aluminium			
No. of busbars				4	8	8	8
Conductor cross section	L1, L2, L3	A	mm^2	1586	1892	2384	3172
	N	A	mm^2	1586	1892	2384	3172
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	2270	2694	2696
Weights			kg/m	31.3	42.0	51.3	63

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

5.3.5 Trunking units LXA..52 (aluminium)

System-specific data			LXA	0152	0252	0452	0552	0652
Rated current		I_e	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.029
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.070	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.035
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.223	0.214	0.180	0.116	0.110
	Reactance	X_F	mΩ/m	0.140	0.139	0.114	0.095	0.071
	Impedance	Z_F	mΩ/m	0.263	0.255	0.213	0.150	0.131
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.187	0.166	0.146	0.125	0.104
	Reactance	X_F	mΩ/m	0.133	0.122	0.110	0.099	0.088
	Impedance	Z_F	mΩ/m	0.229	0.206	0.182	0.159	0.136
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.434	0.473	0.428	0.275	0.277
		X_0	mΩ/m	0.363	0.354	0.293	0.250	0.195
		Z_0	mΩ/m	0.566	0.591	0.519	0.372	0.338
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.100	0.092	0.083	0.074	0.066
		X_0	mΩ/m	0.195	0.177	0.159	0.141	0.123
		Z_0	mΩ/m	0.219	0.199	0.179	0.159	0.139
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				5	5	5	5	5
Conductor cross section	L1, L2, L3	A	mm^2	292	386	586	946	1192
	N	A	mm^2	584	772	1172	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1135	1348
Weights			kg/m	11.6	13.3	17.0	23.8	29.3

System-specific data			LXA	0752	0852	0952	1052
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.009	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.025	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.015
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.108	0.086	0.062	0.065
	Reactance	X_F	mΩ/m	0.077	0.071	0.045	0.044
	Impedance	Z_F	mΩ/m	0.133	0.112	0.077	0.078
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.083	0.062	0.042	0.021
	Reactance	X_F	mΩ/m	0.077	0.065	0.054	0.043
	Impedance	Z_F	mΩ/m	0.113	0.089	0.068	0.047
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.278	0.223	0.158	0.172
		X_0	mΩ/m	0.209	0.195	0.125	0.108
		Z_0	mΩ/m	0.348	0.296	0.202	0.203
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.058	0.049	0.041	0.032
		X_0	mΩ/m	0.105	0.087	0.068	0.050
		Z_0	mΩ/m	0.119	0.099	0.079	0.059
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated impulse withstand current	Peak value	I_{pk}	kA	194	220	255	255
Conductor material				Aluminium			
No. of busbars				5	10	10	10
Conductor cross section	L1, L2, L3	A	mm^2	1586	1892	2384	3172
	N	A	mm^2	3172	3784	4768	6344
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	2270	2694	2696
Weights			kg/m	36.3	48.5	59.2	73.2

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

5.3.6 Trunking units LXA..61 (aluminium)

System-specific data			LXA	0161	0261	0461	0561	0661
Rated current		I_e	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.029
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.070	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.035
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.223	0.214	0.180	0.116	0.110
	Reactance	X_F	mΩ/m	0.140	0.139	0.114	0.095	0.071
	Impedance	Z_F	mΩ/m	0.263	0.255	0.213	0.150	0.131
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.249	0.192	0.194	0.166	0.138
	Reactance	X_F	mΩ/m	0.133	0.122	0.110	0.099	0.088
	Impedance	Z_F	mΩ/m	0.282	0.227	0.223	0.193	0.163
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.434	0.473	0.428	0.275	0.277
		X_0	mΩ/m	0.363	0.354	0.293	0.250	0.195
		Z_0	mΩ/m	0.566	0.591	0.519	0.372	0.338
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.484	0.377	0.376	0.322	0.268
		X_0	mΩ/m	0.175	0.177	0.159	0.141	0.123
		Z_0	mΩ/m	0.515	0.417	0.408	0.351	0.294
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				5	5	5	5	5
Conductor cross section	L1, L2, L3, (PE) [1]	A	mm^2	292	386	586	946	1192
	N	A	mm^2	292	386	586	946	1192
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1135	1348
Weights			kg/m	11.6	13.3	17.0	23.8	29.3

[1] Insulated PE conductor

System-specific data			LXA	0761	0861	0961	1061
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.009	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.025	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.108	0.086	0.062	0.065
	Reactance	X_F	mΩ/m	0.077	0.071	0.045	0.044
	Impedance	Z_F	mΩ/m	0.133	0.112	0.077	0.078
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.111	0.083	0.056	0.028
	Reactance	X_F	mΩ/m	0.077	0.065	0.054	0.023
	Impedance	Z_F	mΩ/m	0.135	0.105	0.077	0.036
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.181	0.158	0.135	0.111
		X_0	mΩ/m	0.136	0.119	0.103	0.088
		Z_0	mΩ/m	0.226	0.197	0.169	0.141
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.214	0.160	0.106	0.052
		X_0	mΩ/m	0.105	0.087	0.068	0.050
		Z_0	mΩ/m	0.238	0.182	0.125	0.072
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated impulse withstand current	Peak value	I_{pk}	kA	194	220	255	255
Conductor material				Aluminium			
No. of busbars				5	10	10	10
Conductor cross section	L1, L2, L3, (PE) [4]	A	mm^2	1586	1892	2384	3172
	N	A	mm^2	1586	1892	2384	3172
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	2270	2694	2696
Weights			kg/m	36.3	48.5	59.2	73.2

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

[4] Insulated PE conductor

5.3.7 Trunking units LXA..62 (aluminium)

System-specific data			LXA	0162	0262	0462	0562	0662
Rated current		I_e	A	800	1000	1250	1600	2000
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.117	0.084	0.056	0.036	0.027
	Reactance	X_{20}	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_{20}	mΩ/m	0.120	0.090	0.061	0.040	0.029
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.146	0.106	0.070	0.043	0.034
	Reactance	X_1	mΩ/m	0.028	0.031	0.024	0.017	0.009
	Impedance	Z_1	mΩ/m	0.149	0.110	0.074	0.046	0.035
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.223	0.214	0.180	0.116	0.110
	Reactance	X_F	mΩ/m	0.140	0.139	0.114	0.095	0.071
	Impedance	Z_F	mΩ/m	0.263	0.255	0.213	0.150	0.131
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.187	0.166	0.146	0.125	0.104
	Reactance	X_F	mΩ/m	0.133	0.122	0.110	0.099	0.088
	Impedance	Z_F	mΩ/m	0.229	0.206	0.182	0.159	0.136
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.434	0.473	0.428	0.275	0.277
		X_0	mΩ/m	0.363	0.354	0.293	0.250	0.195
		Z_0	mΩ/m	0.566	0.591	0.519	0.372	0.338
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.100	0.092	0.083	0.074	0.066
		X_0	mΩ/m	0.195	0.177	0.159	0.141	0.123
		Z_0	mΩ/m	0.219	0.199	0.179	0.159	0.139
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	25	35	50	60	75
Rated peak withstand current	Peak value	I_{pk}	kA	53	70	110	132	158
Conductor material				Aluminium				
No. of busbars				6	6	6	6	6
Conductor cross section	L1, L2, L3, (PE) [1]	A	mm^2	292	386	586	946	1192
	N	A	mm^2	584	772	1172	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1135	1348
Weights			kg/m	12.6	14.7	18.9	26.8	33.1

[1] Insulated PE conductor

System-specific data			LXA	0762	0862	0962	1062
Rated current		I_e	A	2500 [1]	3200	4000 [2]	4500 [3]
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.023	0.018	0.014	0.011
	Reactance	X_{20}	mΩ/m	0.011	0.009	0.005	0.012
	Impedance	Z_{20}	mΩ/m	0.025	0.020	0.015	0.016
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.025	0.022	0.017	0.014
	Reactance	X_1	mΩ/m	0.011	0.008	0.005	0.006
	Impedance	Z_1	mΩ/m	0.028	0.024	0.018	0.015
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.108	0.086	0.062	0.065
	Reactance	X_F	mΩ/m	0.077	0.071	0.045	0.044
	Impedance	Z_F	mΩ/m	0.133	0.112	0.077	0.078
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.083	0.062	0.042	0.021
	Reactance	X_F	mΩ/m	0.077	0.065	0.054	0.043
	Impedance	Z_F	mΩ/m	0.113	0.089	0.068	0.047
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.278	0.223	0.158	0.172
		X_0	mΩ/m	0.209	0.195	0.125	0.108
		Z_0	mΩ/m	0.348	0.296	0.202	0.203
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.058	0.049	0.041	0.032
		X_0	mΩ/m	0.105	0.087	0.068	0.050
		Z_0	mΩ/m	0.119	0.099	0.079	0.059
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	140	150
Rated peak withstand current	Peak value	I_{pk}	kA	194	220	255	255
Conductor material				Aluminium			
No. of busbars				6	12	12	12
Conductor cross section	L1, L2, L3, (PE) [4]	A	mm^2	1586	1892	2384	3172
	N	A	mm^2	3172	3784	4768	6344
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	2270	2694	2696
Weights			kg/m	41.3	55.0	67.2	83.7

[1] Reduction in rated current to 2400 A with horizontal flat mounting position

[2] Reduction in rated current to 3800 A with horizontal flat mounting position

[3] Reduction in rated current to 4300 A with horizontal flat mounting position

[4] Insulated PE conductor

5.3.8 Trunking units LXC..30 (copper)

System-specific data			LXC	0130	0230	0330	0430	0530
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.198	0.188	0.172	0.155	0.142
	Reactance	X_F	mΩ/m	0.157	0.139	0.136	0.114	0.113
	Impedance	Z_F	mΩ/m	0.253	0.234	0.219	0.193	0.181
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.465	0.462	0.427	0.392	0.371
		X_0	mΩ/m	0.416	0.354	0.367	0.289	0.312
		Z_0	mΩ/m	0.616	0.582	0.563	0.488	0.485
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				3	3	3	3	3
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
Weights			kg/m	9.6	17.8	19.9	24.2	28.6

System-specific data			LXC	0630	0730	0830	0930
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.128	0.109	0.076	0.059
	Reactance	X_F	mΩ/m	0.103	0.087	0.058	0.047
	Impedance	Z_F	mΩ/m	0.164	0.140	0.095	0.075
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.350	0.302	0.205	0.159
		X_0	mΩ/m	0.290	0.239	0.158	0.131
		Z_0	mΩ/m	0.455	0.385	0.259	0.140
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				3	3	6	6
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
Weights			kg/m	44.0	55.8	70.7	87.8

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.9 Trunking units LXC..41 (copper)

System-specific data			LXC	0141	0241	0341	0441	0541
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.109	0.088	0.077	0.065	0.049
	Reactance	X_F	mΩ/m	0.079	0.081	0.081	0.065	0.047
	Impedance	Z_F	mΩ/m	0.134	0.120	0.121	0.092	0.068
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.196	0.162	0.142	0.122	0.093
		X_0	mΩ/m	0.121	0.127	0.121	0.095	0.067
		Z_0	mΩ/m	0.230	0.206	0.187	0.154	0.114
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				4	4	4	4	4
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
Equivalent copper cross section	PEN	A	mm^2	1240	1334	1460	1604	1847
Weights			kg/m	17.9	21.6	24.1	29.7	35.3

System-specific data			LXC	0641	0741	0841	0941
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.020	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.032	0.024	0.021	0.018
	Reactance	X_F	mΩ/m	0.033	0.037	0.029	0.018
	Impedance	Z_F	mΩ/m	0.046	0.044	0.036	0.025
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.061	0.047	0.041	0.035
		X_0	mΩ/m	0.046	0.049	0.043	0.026
		Z_0	mΩ/m	0.077	0.068	0.059	0.044
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				4	4	8	8
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
Equivalent copper cross section	PEN	A	mm^2	2540	2934	4162	5080
Weights			kg/m	55.2	70.6	88.9	110.5

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.10 Trunking units LXC..51 (copper)

System-specific data			LXC	0151	0251	0351	0451	0551
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.198	0.188	0.172	0.155	0.142
	Reactance	X_F	mΩ/m	0.157	0.139	0.136	0.114	0.113
	Impedance	Z_F	mΩ/m	0.253	0.234	0.219	0.193	0.181
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.149	0.127	0.104	0.090	0.065
	Reactance	X_F	mΩ/m	0.109	0.118	0.084	0.091	0.062
	Impedance	Z_F	mΩ/m	0.184	0.174	0.134	0.128	0.090
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.465	0.462	0.427	0.392	0.371
		X_0	mΩ/m	0.416	0.354	0.367	0.289	0.312
		Z_0	mΩ/m	0.624	0.582	0.563	0.488	0.485
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.293	0.244	0.204	0.173	0.129
		X_0	mΩ/m	0.153	0.161	0.112	0.119	0.080
		Z_0	mΩ/m	0.330	0.292	0.233	0.210	0.152
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				4	4	4	4	4
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
	N	A	mm^2	292	386	442	586	712
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
Weights			kg/m	17.9	21.6	24.1	29.7	35.3

System-specific data			LXC	0651	0751	0851	0951
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.128	0.109	0.076	0.059
	Reactance	X_F	mΩ/m	0.103	0.087	0.058	0.047
	Impedance	Z_F	mΩ/m	0.164	0.140	0.095	0.075
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.042	0.039	0.030	0.021
	Reactance	X_F	mΩ/m	0.041	0.050	0.036	0.022
	Impedance	Z_F	mΩ/m	0.058	0.064	0.047	0.030
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.350	0.302	0.205	0.159
		X_0	mΩ/m	0.290	0.239	0.158	0.131
		Z_0	mΩ/m	0.455	0.385	0.259	0.206
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.082	0.074	0.061	0.043
		X_0	mΩ/m	0.053	0.062	0.049	0.030
		Z_0	mΩ/m	0.098	0.096	0.078	0.053
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				4	4	8	8
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	1192	1586	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
Weights			kg/m	55.2	70.6	88.9	110.5

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.11 Trunking units LXC..52 (copper)

System-specific data			LXC	0152	0252	0352	0452	0552
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.198	0.188	0.172	0.155	0.142
	Reactance	X_F	mΩ/m	0.157	0.139	0.136	0.114	0.113
	Impedance	Z_F	mΩ/m	0.253	0.234	0.219	0.193	0.181
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.112	0.100	0.088	0.076	0.064
	Reactance	X_F	mΩ/m	0.129	0.118	0.107	0.096	0.085
	Impedance	Z_F	mΩ/m	0.170	0.154	0.138	0.122	0.106
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.465	0.462	0.427	0.392	0.371
		X_0	mΩ/m	0.416	0.354	0.367	0.289	0.312
		Z_0	mΩ/m	0.624	0.582	0.563	0.488	0.485
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.220	0.197	0.173	0.149	0.126
		X_0	mΩ/m	0.177	0.162	0.146	0.131	0.115
		Z_0	mΩ/m	0.282	0.255	0.226	0.198	0.170
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				5	5	5	5	5
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
	N	A	mm^2	584	772	884	1172	1424
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
Weights			kg/m	20.7	25.3	28.2	35.2	41.9

System-specific data			LXC	0652	0752	0852	0952
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.128	0.109	0.076	0.059
	Reactance	X_F	mΩ/m	0.103	0.087	0.058	0.047
	Impedance	Z_F	mΩ/m	0.164	0.140	0.095	0.075
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.052	0.040	0.028	0.016
	Reactance	X_F	mΩ/m	0.074	0.063	0.052	0.042
	Impedance	Z_F	mΩ/m	0.090	0.074	0.059	0.044
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.350	0.302	0.205	0.159
		X_0	mΩ/m	0.290	0.239	0.158	0.131
		Z_0	mΩ/m	0.455	0.385	0.259	0.206
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.103	0.079	0.056	0.032
		X_0	mΩ/m	0.100	0.084	0.069	0.053
		Z_0	mΩ/m	0.143	0.115	0.088	0.061
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				5	5	10	10
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	2384	3172	3784	4768
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
Weights			kg/m	66.3	85.5	107.2	133.2

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.12 Trunking units LXC..53 (copper)

System-specific data			LXC	0153	0253	0353	0453	0553
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.159	0.149	0.131	0.115	0.101
	Reactance	X_F	mΩ/m	0.149	0.131	0.126	0.106	0.103
	Impedance	Z_F	mΩ/m	0.218	0.198	0.182	0.156	0.144
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.149	0.133	0.117	0.101	0.085
	Reactance	X_F	mΩ/m	0.129	0.118	0.107	0.096	0.085
	Impedance	Z_F	mΩ/m	0.197	0.177	0.158	0.139	0.120
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.348	0.345	0.305	0.270	0.249
		X_0	mΩ/m	0.392	0.330	0.337	0.265	0.282
		Z_0	mΩ/m	0.524	0.478	0.455	0.379	0.377
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.293	0.262	0.230	0.199	0.168
		X_0	mΩ/m	0.177	0.162	0.146	0.131	0.115
		Z_0	mΩ/m	0.342	0.308	0.272	0.238	0.203
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				5	5	5	5	5
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
	N	A	mm^2	292	386	442	586	712
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
	+ busbar	A	mm^2	292	386	442	586	712
Weights			kg/m	20.7	25.3	28.2	35.2	41.9

System-specific data			LXC	0653	0753	0853	0953
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.087	0.069	0.048	0.029
	Reactance	X_F	mΩ/m	0.091	0.075	0.062	0.049
	Impedance	Z_F	mΩ/m	0.126	0.101	0.078	0.057
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.069	0.053	0.037	0.021
	Reactance	X_F	mΩ/m	0.074	0.063	0.052	0.042
	Impedance	Z_F	mΩ/m	0.101	0.082	0.063	0.046
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.228	0.180	0.122	0.070
		X_0	mΩ/m	0.254	0.203	0.170	0.137
		Z_0	mΩ/m	0.342	0.271	0.209	0.154
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.137	0.105	0.074	0.043
		X_0	mΩ/m	0.100	0.084	0.069	0.053
		Z_0	mΩ/m	0.169	0.134	0.101	0.068
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				5	5	10	10
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	1192	1586	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
	+ busbar	A	mm^2	1192	1586	1892	2384
Weights			kg/m	66.3	85.5	107.2	133.2

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.13 Trunking units LXC..54 (copper)

System-specific data			LXC	0154	0254	0354	0454	0554
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.159	0.149	0.131	0.115	0.101
	Reactance	X_F	mΩ/m	0.149	0.131	0.126	0.106	0.103
	Impedance	Z_F	mΩ/m	0.218	0.198	0.182	0.156	0.144
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.112	0.100	0.088	0.076	0.064
	Reactance	X_F	mΩ/m	0.129	0.118	0.107	0.096	0.085
	Impedance	Z_F	mΩ/m	0.170	0.154	0.138	0.122	0.106
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.348	0.345	0.305	0.270	0.249
		X_0	mΩ/m	0.392	0.330	0.337	0.265	0.282
		Z_0	mΩ/m	0.524	0.478	0.455	0.379	0.377
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.220	0.197	0.173	0.149	0.126
		X_0	mΩ/m	0.177	0.162	0.146	0.131	0.115
		Z_0	mΩ/m	0.282	0.255	0.226	0.198	0.170
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				6	6	6	6	6
Conductor cross section	L1, L2, L3	A	mm^2	292	386	442	586	712
	N	A	mm^2	584	772	884	1172	1424
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
	+ busbar	A	mm^2	292	386	442	586	712
Weights			kg/m	23.5	29	32.4	40.8	48.6

System-specific data			LXC	0654	0754	0854	0954
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.087	0.069	0.048	0.029
	Reactance	X_F	mΩ/m	0.091	0.075	0.062	0.049
	Impedance	Z_F	mΩ/m	0.126	0.101	0.078	0.057
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.052	0.040	0.028	0.016
	Reactance	X_F	mΩ/m	0.074	0.063	0.052	0.042
	Impedance	Z_F	mΩ/m	0.090	0.074	0.059	0.044
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.228	0.180	0.122	0.070
		X_0	mΩ/m	0.254	0.203	0.170	0.137
		Z_0	mΩ/m	0.342	0.271	0.209	0.154
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.103	0.079	0.056	0.032
		X_0	mΩ/m	0.100	0.084	0.069	0.053
		Z_0	mΩ/m	0.143	0.115	0.088	0.061
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				6	6	12	12
Conductor cross section	L1, L2, L3	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	2384	3172	3784	4768
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
	+ busbar	A	mm^2	1192	1586	1872	2384
Weights			kg/m	77.5	100.4	125.4	155.9

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

5.3.14 Trunking units LXC..61 (copper)

System-specific data			LXC	0161	0261	0361	0461	0561
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.198	0.188	0.172	0.155	0.142
	Reactance	X_F	mΩ/m	0.157	0.139	0.136	0.114	0.113
	Impedance	Z_F	mΩ/m	0.253	0.234	0.219	0.193	0.181
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.149	0.127	0.117	0.101	0.085
	Reactance	X_F	mΩ/m	0.129	0.118	0.107	0.096	0.085
	Impedance	Z_F	mΩ/m	0.197	0.174	0.158	0.139	0.120
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.465	0.462	0.427	0.392	0.371
		X_0	mΩ/m	0.416	0.354	0.367	0.289	0.312
		Z_0	mΩ/m	0.624	0.582	0.563	0.488	0.485
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.293	0.262	0.230	0.199	0.168
		X_0	mΩ/m	0.177	0.162	0.146	0.131	0.115
		Z_0	mΩ/m	0.342	0.308	0.272	0.238	0.203
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				5	5	5	5	5
Conductor cross section	L1, L2, L3, (PE) [6]	A	mm^2	292	386	442	586	712
	N	A	mm^2	292	386	442	586	712
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
Weights			kg/m	20.7	25.3	28.2	35.2	41.9

System-specific data			LXC	0661	0761	0861	0961
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.128	0.109	0.076	0.059
	Reactance	X_F	mΩ/m	0.103	0.087	0.058	0.047
	Impedance	Z_F	mΩ/m	0.164	0.140	0.095	0.075
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.069	0.053	0.037	0.021
	Reactance	X_F	mΩ/m	0.074	0.063	0.052	0.042
	Impedance	Z_F	mΩ/m	0.101	0.082	0.063	0.046
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.350	0.302	0.205	0.159
		X_0	mΩ/m	0.290	0.239	0.158	0.131
		Z_0	mΩ/m	0.455	0.385	0.259	0.206
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.137	0.105	0.074	0.043
		X_0	mΩ/m	0.100	0.084	0.069	0.053
		Z_0	mΩ/m	0.169	0.134	0.101	0.068
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				5	5	10	10
Conductor cross section	L1, L2, L3, (PE) [6]	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	1192	1586	1892	2384
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
Weights			kg/m	66.3	85.5	107.2	133.2

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

[6] Insulated PE conductor

5.3.15 Trunking units LXC..62 (copper)

System-specific data			LXC	0162	0262	0362	0462	0562
Rated current		I_e	A	1000 [1]	1250	1400 [2]	1600 [3]	2000 [4]
Conductor impedance								
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.065	0.051	0.044	0.037	0.027
	Reactance	X_{20}	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_{20}	mΩ/m	0.071	0.059	0.048	0.045	0.030
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.083	0.065	0.055	0.045	0.035
	Reactance	X_1	mΩ/m	0.027	0.031	0.020	0.026	0.013
	Impedance	Z_1	mΩ/m	0.087	0.072	0.059	0.051	0.037
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.198	0.188	0.172	0.155	0.142
	Reactance	X_F	mΩ/m	0.157	0.139	0.136	0.114	0.113
	Impedance	Z_F	mΩ/m	0.253	0.234	0.219	0.193	0.181
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.112	0.100	0.088	0.076	0.064
	Reactance	X_F	mΩ/m	0.129	0.118	0.107	0.096	0.085
	Impedance	Z_F	mΩ/m	0.170	0.154	0.138	0.122	0.106
Zero impedance								
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.465	0.462	0.427	0.392	0.371
		X_0	mΩ/m	0.416	0.354	0.367	0.289	0.312
		Z_0	mΩ/m	0.624	0.582	0.563	0.488	0.485
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.220	0.197	0.173	0.149	0.126
		X_0	mΩ/m	0.177	0.162	0.146	0.131	0.115
		Z_0	mΩ/m	0.282	0.255	0.226	0.198	0.170
Short-circuit rating								
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	38	50	57	60	75
Rated impulse withstand current	Peak value	I_{pk}	kA	80	110	125	132	165
Conductor material				Copper				
No. of busbars				6	6	6	6	6
Conductor cross section	L1, L2, L3, (PE) [6]	A	mm^2	292	386	442	586	712
	N	A	mm^2	584	772	884	1172	1424
Equivalent copper cross section	PE = enclosure	A	mm^2	948	948	1018	1018	1135
Weights			kg/m	23.5	29	32.4	40.8	48.6

System-specific data			LXC	0662	0762	0862	0962
Rated current		I_e	A	2500	3200 [5]	4000	5000
Conductor impedance							
At 50 Hz and + 20 °C busbar temperature	Resistance	R_{20}	mΩ/m	0.017	0.013	0.011	0.009
	Reactance	X_{20}	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_{20}	mΩ/m	0.019	0.017	0.014	0.010
At 50 Hz and final heating of busbars	Resistance	R_1	mΩ/m	0.021	0.016	0.014	0.011
	Reactance	X_1	mΩ/m	0.009	0.011	0.008	0.005
	Impedance	Z_1	mΩ/m	0.022	0.019	0.016	0.012
for 5-pole systems (PE) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.128	0.109	0.076	0.059
	Reactance	X_F	mΩ/m	0.103	0.087	0.058	0.047
	Impedance	Z_F	mΩ/m	0.164	0.140	0.095	0.075
for 5-pole systems (N) under fault conditions acc. to EN 60439-2	Resistance	R_F	mΩ/m	0.052	0.040	0.028	0.016
	Reactance	X_F	mΩ/m	0.074	0.063	0.052	0.042
	Impedance	Z_F	mΩ/m	0.090	0.074	0.059	0.044
Zero impedance							
for 5-pole systems (PE) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.350	0.302	0.205	0.159
		X_0	mΩ/m	0.290	0.239	0.158	0.131
		Z_0	mΩ/m	0.455	0.385	0.259	0.206
for 5-pole systems (N) acc. to DIN EN 60909-0/ VDE 0102		R_0	mΩ/m	0.103	0.079	0.056	0.032
		X_0	mΩ/m	0.100	0.084	0.069	0.053
		Z_0	mΩ/m	0.143	0.115	0.088	0.061
Short-circuit rating							
Rated short-time withstand current	rms value t = 1 s	I_{cw}	kA	86	100	150	150
Rated impulse withstand current	Peak value	I_{pk}	kA	189	220	255	255
Conductor material				Copper			
No. of busbars				6	6	12	12
Conductor cross section	L1, L2, L3, (PE) [6]	A	mm^2	1192	1586	1892	2384
	N	A	mm^2	2384	3172	3784	4768
Equivalent copper cross section	PE = enclosure	A	mm^2	1348	1348	2270	2696
Weights			kg/m	77.5	100.4	125.4	155.9

[1] Reduction in rated current to 800 A with horizontal flat mounting position

[2] Reduction in rated current to 1380 A with horizontal flat mounting position

[3] Reduction in rated current to 1570 A with horizontal flat mounting position

[4] Reduction in rated current to 1900 A with horizontal flat mounting position

[5] Reduction in rated current to 3100 A with horizontal flat mounting position

[6] Insulated PE conductor

5.3.16 Fire load for trunking units without tap-off points

System	Fire load [kWh/m]
LXA(C)0141 LXA(C)0151	1.95
LXA(C)0241 LXA(C)0251	2.04
LXC0341 LXC0351	2.42
LXA(C)0441 LXA(C)0451	2.53
LXA0541 LXA0551	3.54
LXC0541 LXC0551	3.48
LXA(C)0641 LXA(C)0651	5.33
LXA(C)0741 LXA(C)0751	5.42
LXA(C)0841 LXA(C)0851	7.28
LXA(C)0941 LXA(C)0951	10.88
LXA1041 LXA1051	11.07

For trunking units with tap-off points, regardless of system size, a fire load of 2.9 kWh must be taken into account for each tap-off point.

Fire load values for LX...30, LX...52, LX...53, LX...54, LX...61, LX...62 are only available on request.

5.3.17 Fixing distances

Fixing distances [m] for conventional mechanical load with horizontal installation

System	Edgewise busbars	Flat busbars
LXA(C)01..	2	2
LXA(C)02..	2	2
LXC03..	2	2
LXA(C)04..	2	2
LXA(C)05..	3	2
LXA(C)06..	3	2
LXA(C)07..	3	2
LXA(C)08..	3	2
LXA(C)09..	3	2
LXA10..	3	2

5.3.18 Connection units for non-Siemens distribution boards

The required conductor cross sections for bare copper bars for connection to connection units for non-Siemens distribution boards.

System	I_e [A]	Number ... Cu bar width x thickness				Compatible LXA/LXC system
		1	2	3	4	
LXC(A)01..	1000 (800) [1]	60 x 10	30 x 10	20 x 10	-	LXA01.. and LXC01..
LXC(A)02..	1250 (1000) [1]	80 x 10	40 x 10	30 x 10	-	LXA02.. and LXC02..
LXC03..	1400	100 x 10	50 x 10	30 x 10	-	LXC03..
LXC(A)04..	1600 (1250) [1]	100 x 10	60 x 10	30 x 10	-	LXA04.. and LXC04..
LXA05..	1600	100 x 10	60 x 10	30 x 10	-	LXA05..
LXC05..	2000	160 x 10	80 x 10	50 x 10	-	LXC05..
LXC(A)06..	2500 (2000) [1]	200 x 10	100 x 10	60 x 10	50 x 10	LXC06.. and LXA06..
LXC(A)07..	3200 (2500) [1]	-	160 x 10	100 x 10	80 x 10	LXC07.. and LXA07..
LXC(A)08..	4000 (3200) [1]	-	200 x 10	120 x 10	100 x 10 [2]	LXC08.. and LXA08..
LXC(A)09..	5000 (4000) [1]	-	-	200 x 10	160 x 10	LXC09.. and LXA09..
LXA10..	4500	-	-	160 x 10	120 x 10	LXA10..

[1] Connection to LXA systems

[2] In accordance with DIN 43671, Table 1, the maximum continuous current for this copper cross section is 3980 A.

5.3.19 Tap-off units

Standards and regulations		DIN EN 60439-1/VDE 0660-500 DIN EN 60439-2/VDE 0660-502
Resistance to extreme climates		Damp heat, constant, acc. to IEC 60068-2-78 Damp heat, cyclic, acc. to IEC 60068-2-30
Ambient temperature	°C	–5/+40/+35 (min./max./24-hour average)
Degree of protection		IP54, IP55 on request
Trunking unit material		Sheet steel, painted
Colour of tap-off units		RAL 7035 (light grey)
Dimensions		See also Chapter Dimension drawings (Page 206)
Rated insulation voltage U_i	V AC	690
Overvoltage category/ pollution degree		III/3 acc. to DIN EN 60947-1/VDE 0660-100
Rated operating voltage U_e	V AC	400
Rated frequency	Hz	50

		Size 1	Size 2	Size 3	Size 4
Tap-off units with circuit breaker					
Rated current I_e	A	50; 63; 80; 100; 125; 160; 200; 250	315 400 630	—	800 [2]; 1000 [2]; 1250
Max. permissible operating current $I_{r\,max}$ [1]	A	in accordance with I_e	315 380 520		in accordance with I_e
Conditional short-circuit rating I_{cc}	kA	65	65	—	100
Connectable cross sections (CU)					
L1, L2, L3	mm^2	1 x 50 ... 150 2 x 25 ... 70	1 x 70 ... 240 2 x 70 ... 120	—	1 x 70 ... 240 4 x 70 ... 240
N, PE, ISO-PE	mm^2	1 x 50 ... 150 2 x 25 ... 70	1 x 70 ... 240 2 x 70 ... 120	—	1 x 70 ... 240 4 x 70 ... 240
Bolted connection		M8	315 A: M8 400 A: M10 630 A: M12	—	M12

		Size 1	Size 2	Size 3	Size 4
Cable entry					
front face		Yes	Yes	—	No
side		No	Yes	—	Yes
Multi-core cable [4]					
Cable grommets		M63	2 x KT4	—	4 x KT4
Cable diameter (mm)		18 ... 47 (for 50 A ... 200 A) 14 ... 68 (for 250 A)	14 ... 68	—	14 ... 68
Single-core cable [3], aluminium plate, undrilled		12 x M40 (for 160 A, 200 A, 250 A only)	12 x M40	—	12 x M40
Weights	kg	9.5 (to 125 A) 19 (to 250 A)	37.2 (to 400 A) 44 (to 630 A)	—	155 (3-pole circuit breaker) 163 (4-pole circuit breaker)
Tap-off units with fuse switch disconnector					
Rated current I_e	A	125 250	400	630	—
Max. rated current I_{max} of the fuse	A	125 250	400	630	—
Max. permissible operating current $I_{r\,max}$		100 200	320	500	—
Rated short-circuit current with fuse protection	kA	100 (80) [3]	100 (80) [3]	—	—
Connectable cross sections (CU)					
L1, L2, L3	mm^2	1 x 50...150 2 x 50...120	1 x 95...240 2 x 95...120	1 x 95...240 2 x 95...120	—
N, PE, ISO-PE	mm^2	1 x 50...150 2 x 50...120	1 x 95...240 2 x 95...120	1 x 95...240 2 x 95...120	—
Bolted connection		M8	M10	M12	—
Cable entry					
front face		Yes	Yes	Yes	—
side		No	Yes	Yes	—
Multi-core cable					
Cable grommets		M63	2 x KT4	2 x KT4	—
Cable diameter (mm)		28...48	16...68	14...68	—
Single-core cable [4], aluminium plate, undrilled		12 x M40	12 x M40	12 x M40	—
Weights	kg	9,6 (to 125 A) 20.5 (to 250 A)	32.9	50	—

1) For "suspended, below" installation of the tap-off units, a reduction by 10% is necessary (reduction factor 0.9).

2) For "suspended, below" installation of the tap-off units, no reduction is necessary

3) Values in brackets apply when using fuses in accordance with BS standard

4) Cable glands with strain relief are required (not included in the scope of delivery).

5.4 Dimension drawings

5.4.1 Trunking units

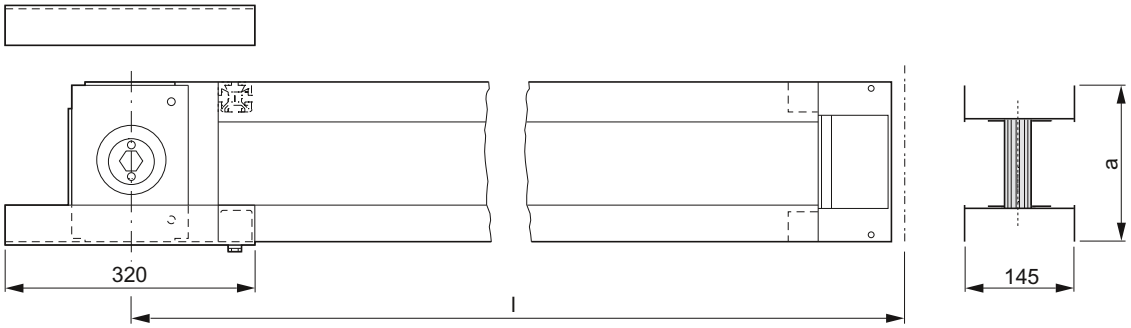


Figure 5-14 Single systems LXA(C)01 to 07

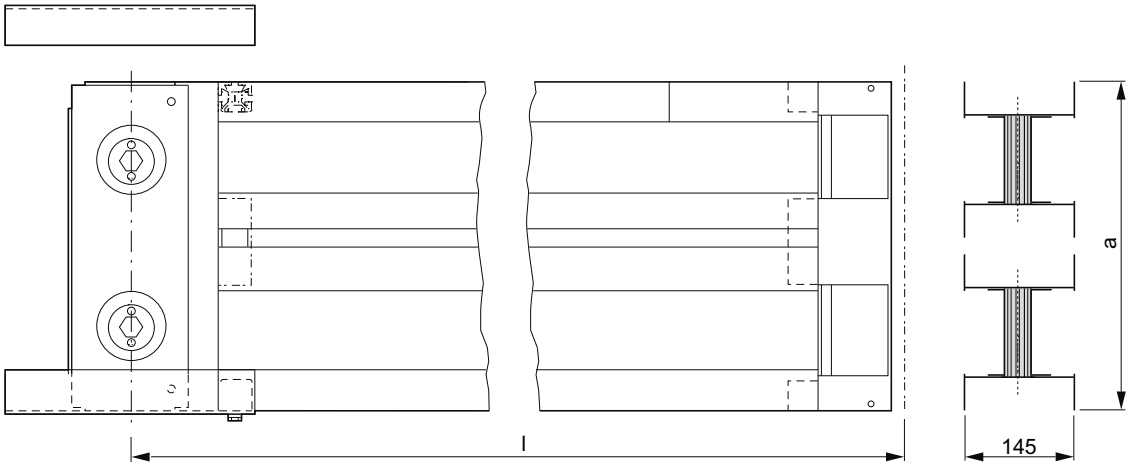


Figure 5-15 Double systems LXA(C)08 to 10

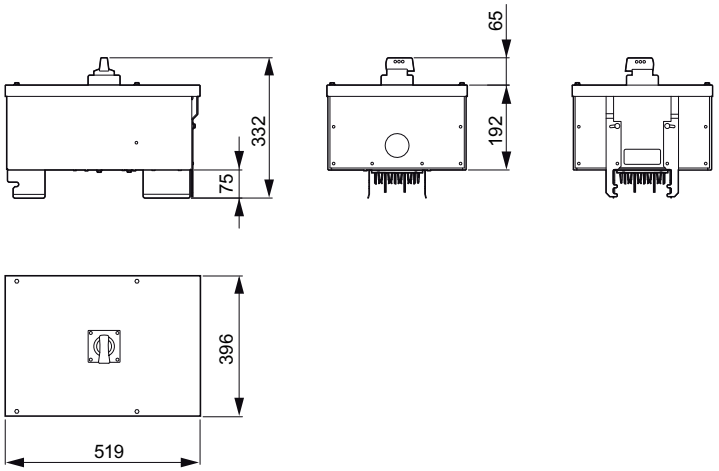
System	l	a
LXA(C)01	350 ... 3000	137
LXA(C)02	350 ... 3000	137
LXC03	350 ... 3000	162
LXA(C)04	350 ... 3000	162
LXA(C)05	350 ... 3000	207
LXA(C)06	350 ... 3000	287
LXA(C)07	350 ... 3000	287
LXA(C)08	350 ... 3000	439
LXA(C)09	350 ... 3000	599
LXA10	350 ... 3000	599

5.4.2 Tap-off units

5.4.2.1 Tap-off units with circuit-breaker

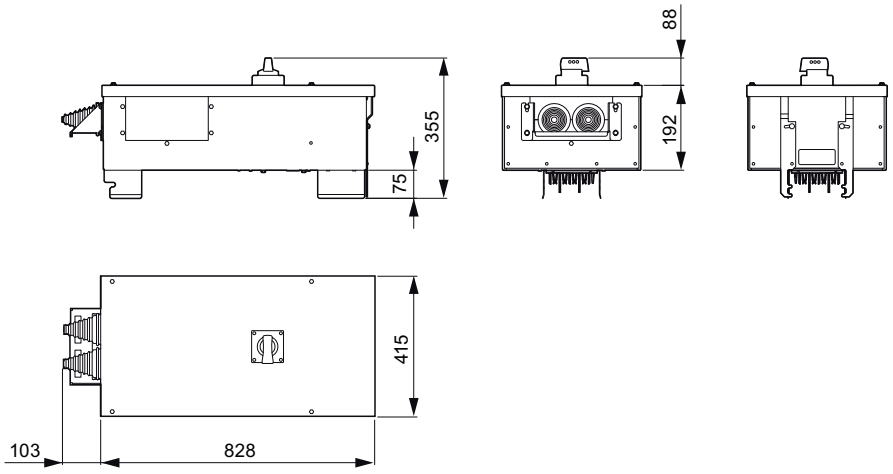
Size 1 (50 A to 250 A)

With circuit-breaker 3VL

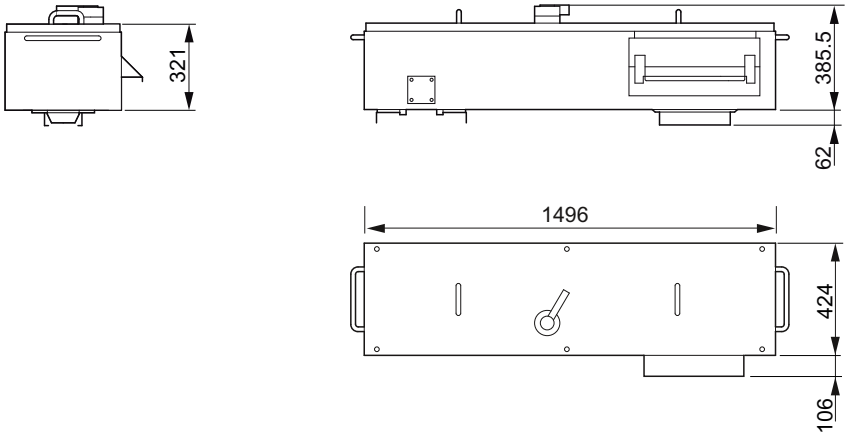


Size 2 (315 A to 630 A)

With circuit-breaker 3VL

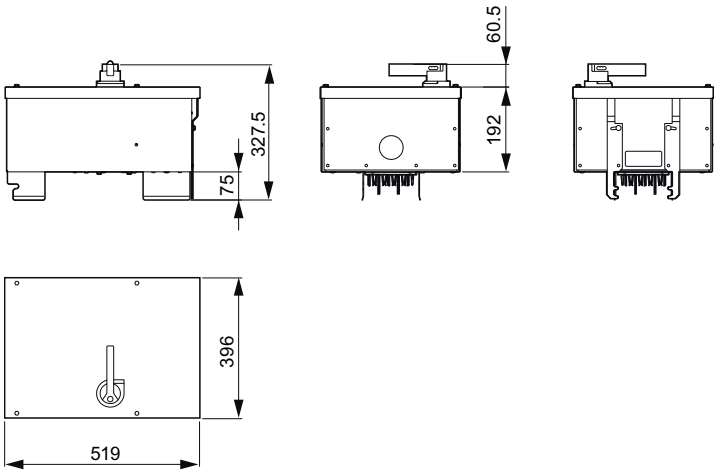


Size 4 (800 A to 1250 A)

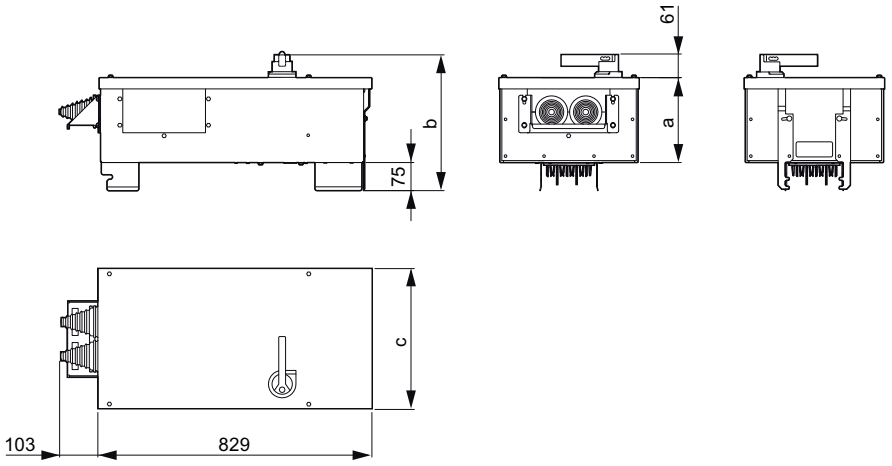


5.4.2.2 Tap-off units with fuse switch disconnector

Size 1 (125 A and 250 A)



Size 2 or 3 (400 A and 630 A)

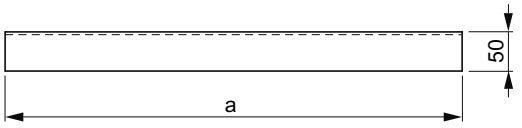


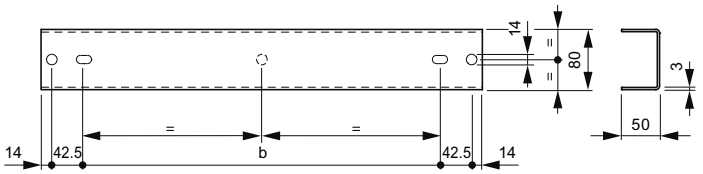
Type	a	b	c
LX-AK5(6)/FSH-400IEC(BS)-3(4)S	192	328	415
LX-AK5(6)FSH-630IEC(BS)-3(4)S	282	418	590

5.4.3 Additional equipment

Fixing brackets for horizontal busbar run

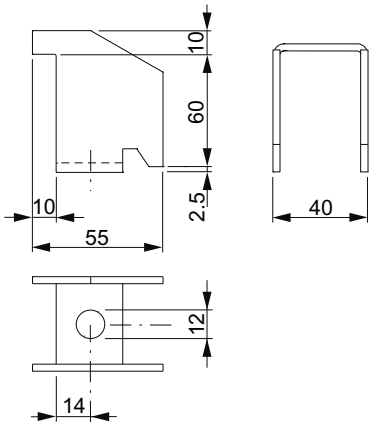
LX-K terminal clamps are included in the scope of supply of the fixing brackets.



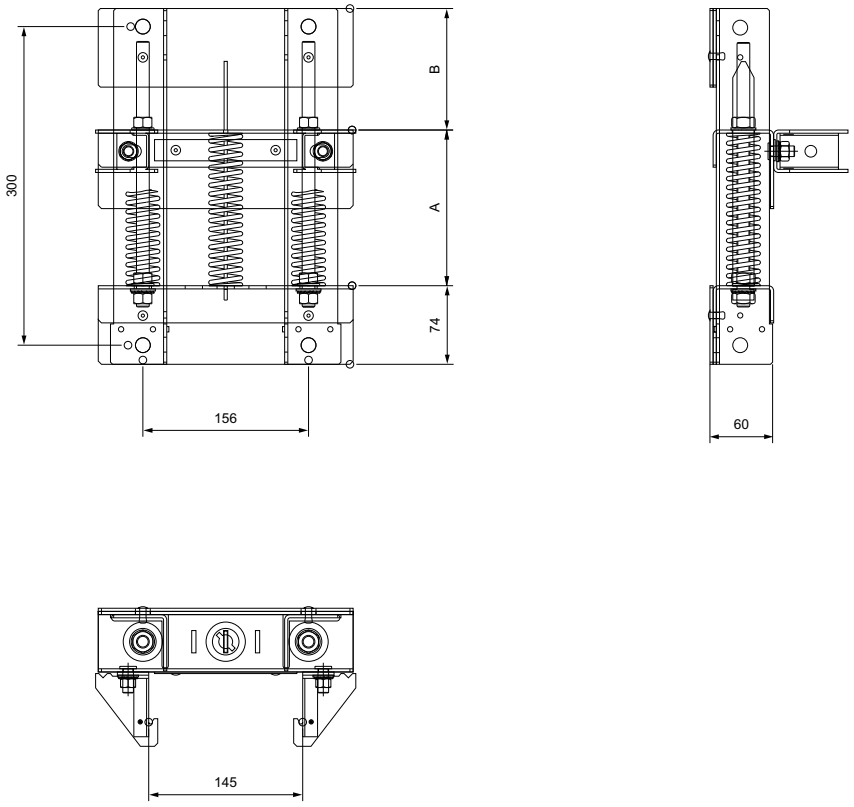


Type	a	b
LX-BH(F)	285	172
LX01..-BH(F)	285	172
LX02..-BH(F)	285	172
LX03..-BH(F)	307	194
LX04..-BH(F)	307	194
LX05..-BH(F)	352	239
LX06..-BH(F)	432	319
LX07..-BH(F)	432	319
LX08..-BH(F)	584	471
LX09..-BH(F)	744	631
LX10..-BH(F)	744	631

Clamp for fixing onto bracket/rack



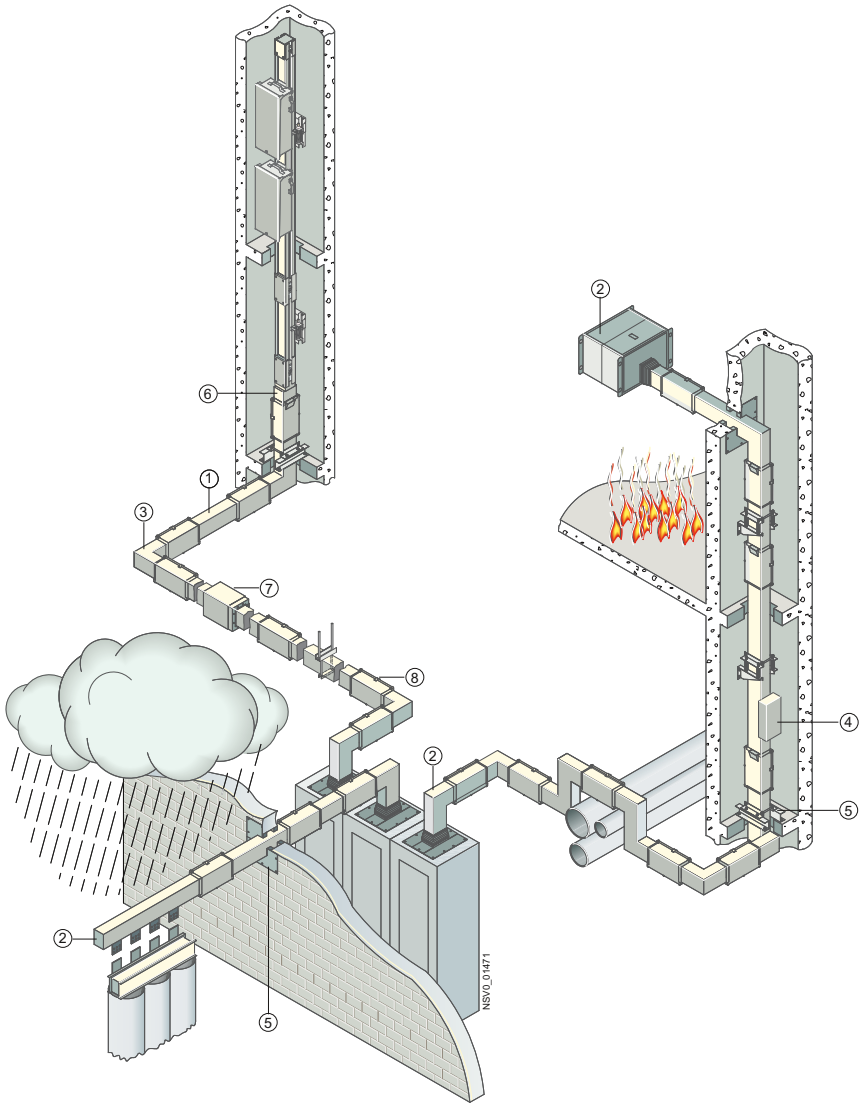
Fixing bracket for vertical busbar run



Planning with LR

6

6.1 System description



① Straight trunking units
② Feeder units
③ Junction units
④ Tap-off units
⑤ Accessories
⑥ Adapter for the LX system
⑦ Expansion compensation
⑧ Encapsulated joint unit

Figure 6-1 LR system structure

Thanks to its cast epoxy enclosure with high IP68 degree of protection and high short-circuit rating, the LR system can provide an assurance of reliable power transmission even under the harshest ambient conditions. It is entirely resistant to environmental factors such as air humidity and corrosive or salty atmospheres.

The compact system is suitable for flat, edgewise, vertical or horizontal installation as per requirements in applications from 400 A to 6150 A. Bracket pieces, connectors and T pieces to create junction units facilitate optimisation in line with structural conditions within the most compact of dimensions. The LR system is even ideal for use outdoors.

6.2 System components

6.2.1 Preliminary remark for specifications

Basic description busbar trunking systems 400 A to 6150 A

Busbar trunking systems shall be supplied and installed as ready-to-use type-tested low-voltage switchgear assemblies (TTA).

The following descriptions are part of the costing and contracts process. They must be considered when specifying individual systems and equipment, even if they are not subsequently referred to in more detail.

The busbar trunking system has to be suitable for power transmission, e.g. between transformer and low-voltage main distribution board, and power distribution in the form of a power supply, as well as for horizontal and vertical installation.

The busbar trunking system must comprise listed system components such as:

- Straight trunking units
- Feeder units for incoming transformer, distribution board and cable connection units
- Junction units with elbow, offset elbow, knee, offset knee, Z units and T units
- Joint units
- Accessories

The busbar trunking system must comprise standardised factory-built system components. It is not permitted to set up flexible junction units and junction units using cable connections. Expansion units and fixed points must be planned as per requirements.

Standard components are connected to the tap points on the trunking units as required. It must be possible to select the number and position of tap-off points. The bolt-on tap-off units can only be installed and removed when voltage-free.

If required, it must be possible to fit the busbar trunking system with an asbestos-free fireproof barrier for wall or ceiling mounting which is compliant with the fire resistance class S60, S90 or S120.

The enclosure is of epoxy resin and is corrosion-free. The cross section of the trunking units must not exceed the dimensions specified in the technical data.

The individual system components must be connected by screwing on a state-of-the-art bolted joint block.

The connection must be encapsulated in cast resin and closed following installation of the bolted joint block.

The busbars must be made of copper-coated aluminium or copper. The outer dimensions of the enclosure/casing must not exceed the values specified in the technical data.

The fire load must not exceed the value specified in the technical data.

Conformity and test certificates

The manufacturer of the busbar system must have in place and be able to prove compliance with a quality management system in accordance with EN ISO 9001.

Proof of compliance with the following requirements must be provided for the entire system in the form of certificates or declarations of conformity:

- Type test acc. to DIN EN 60439-1/VDE 0660-500 and DIN EN 60439-2/VDE 0660-502
- Resistance to extreme climates acc. to IEC 60068-2-78 (constant) and IEC 60068-2-30 (cyclic)
- Fire protection acc. to DIN 4102-9

Reliable proof of special additional characteristics (e.g. functional endurance) of system components must be provided.

Technical data for busbar trunking systems

Ambient temperature min./max./24-hour average	–5/+40/35°C
Degree of protection	IP68
Torque for joint block	LR.01 – LR03: 40 Nm [1)] LR.04 – LR29: 84 Nm [1)]
Trunking unit material	Epoxy resin
Colour of trunking units	Similar to RAL 7030 (stone grey)
Rated insulation voltage U_i	1000 VAC
Rated operating voltage U_e	1000 VAC
Rated frequency f	50...60 Hz
Rated current I_e	_____ [2)]
Rated short-time withstand current	
• External conductor I_{cw} (1 s)	_____ [2)]
• Neutral conductor I_{cw} (1 s)	_____ [2)]
• 5. conductor I_{cw} (1 s)	_____ [2)]
Rated peak withstand current I_{pk}	_____ [2)]
Conductor material	AL/CU [1)]
No. of busbars	_____ [2)]
Conductor cross section	
• L1, L2, L3	_____ [2)]
• N	_____ [2)]
• PE	_____ [2)]
Fire loads	
• Trunking unit	_____ [2)]
Maximum fixing distances	
• Horizontal edgewise	_____ [2)]
• Horizontal flat	_____ [2)]
• Vertical	_____ [2)]
Enclosure dimensions	_____ [2)]

[1)] Please delete as appropriate.

[2)] Enter data for selected systems. For values see Technical data (Page 232))

6.2.2 Type code

The components of the LR system are determined using a type code. The type is specified and selected on the basis of rated current, conductor material and system type or conductor configuration.

The resulting type code enables the product to be ordered to be precisely defined.

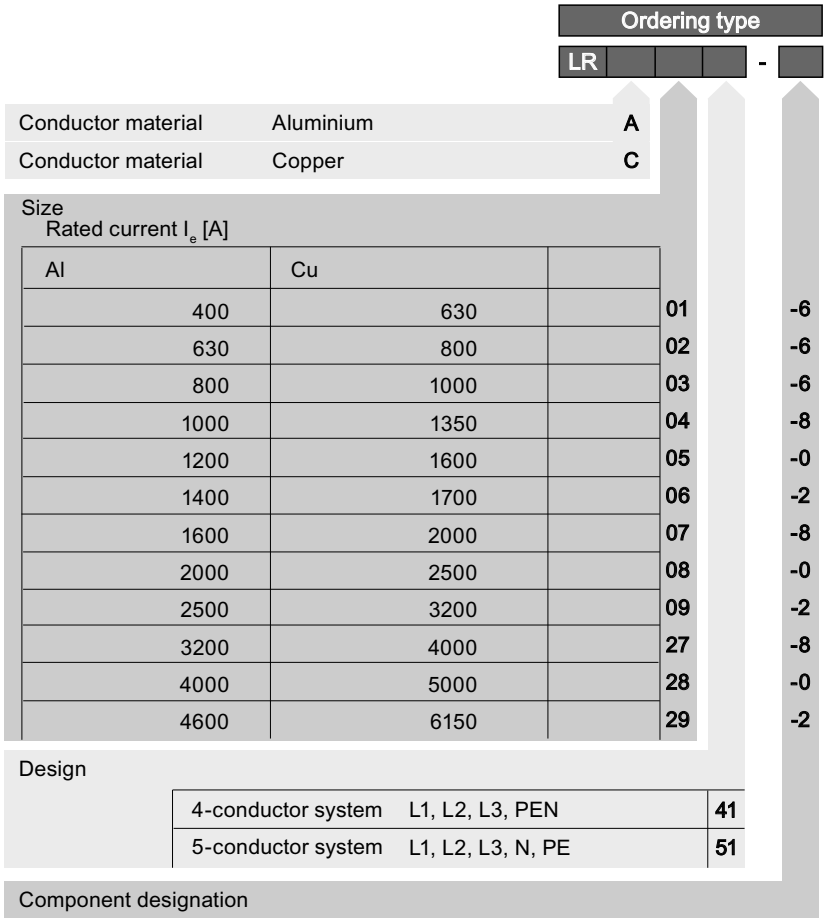


Figure 6-2 Type codes LRA/LRC

Selection example:

A rated current of 2500 A is calculated for a project. A 5-pole system has to be used.

This results in type **LRC0851-0**.

6.2.3 System sizes and structure

Sizes

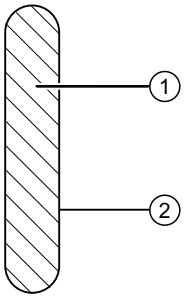
The sizes are dependent upon the rated current rating. In total, there are nine sizes. Six sizes are set up as single systems and three as double systems.

Single systems comprise one enclosure with 4 to 5 aluminium busbars for the LRA system and 4 to 5 copper bars for the LRC system. Double systems have between 8 and 10 bars in two enclosures.

The precise number of bars is determined by the required conductor configuration.

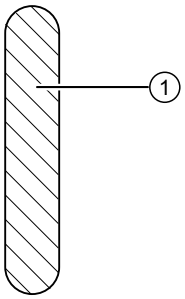
Structure of the busbars

The busbars of the LRA system are surface-treated (copper-coated), and the busars of the LRC system are not.



① Aluminium bar
② Copper coating

Figure 6-3 LRA busbar system

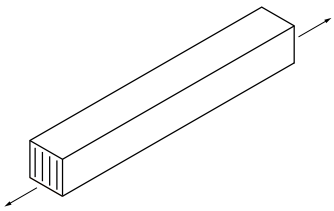


① Copper bar

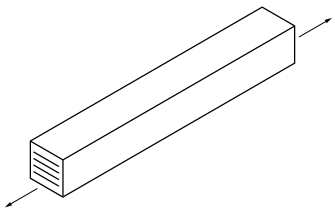
Figure 6-4 LRC busbar system

Mounting positions and rated current

The potted construction means that the current-effected heat rise of the LR busbar system is not affected by the mounting position. This guarantees high flexibility for positioning the busbar runs. Current derating is not required for busbars in edgewise and flat positions on horizontal busbar runs or on rising main busbars (vertical busbar runs).



Horizontal busbar run, edgewise busbars

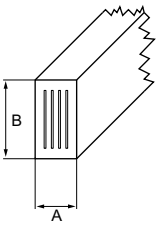
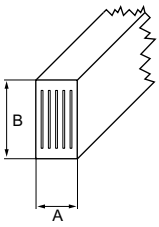
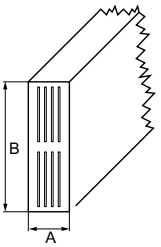
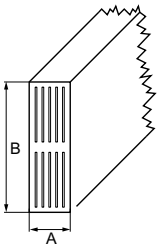


Horizontal busbar run, flat busbars

Vertical busbar run

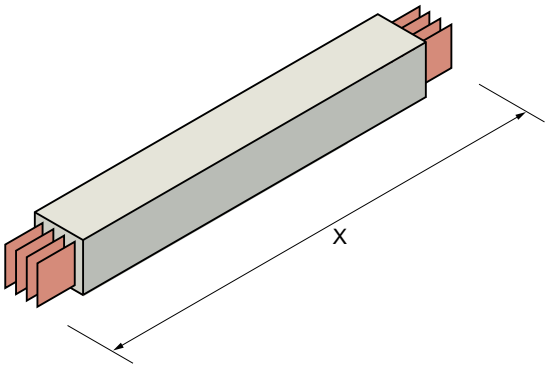
6.2.4 Conductor configuration and sizes

The LRA/LRC busbar system is available with two different conductor configurations dependent upon system type and the size of the N and PE cross sections.

I_E [A]		4-conductor system				5-conductor system			
LRA	LRC		System	A	B		System	A	B
400	630		LR.0141	90	90		LR.0151	90	90
630	800		LR.0241				LR.0251		
800	1000		LR.0341				LR.0351		
1000	1350		LR.0441	100	120		LR.0451	120	120
1200	1600		LR.0541		150		LR.0551		150
1400	1700		LR.0641				LR.0651		
1600	2000		LR.0741		190		LR.0751		192
2000	2500		LR.0841		220		LR.0851		220
2500	3200		LR.0941		240		LR.0951		240
3200	4000		LR.2741	100	380		LR.2751	120	380
4000	5000		LR.2841		440		LR.2851		440
4600	6150		LR.2941		480		LR.2951		480

6.2.5 Straight trunking units

Straight trunking units for horizontal and vertical installation without tap points and joint unit



Configurable lengths X from 0.30 m to 3.00 m in 0.01 m steps available

Straight trunking units for tap-off units on request

Straight trunking units to adapt to LX systems for indoor applications

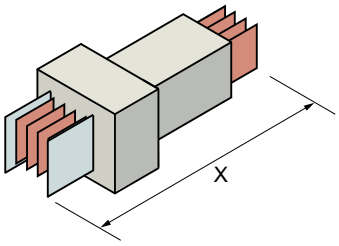


Figure 6-5 Adapter element (X = 0.6 m)

Straight trunking units to adapt to LD systems for indoor applications

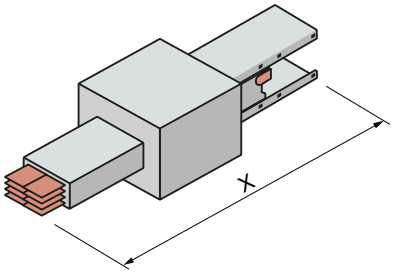
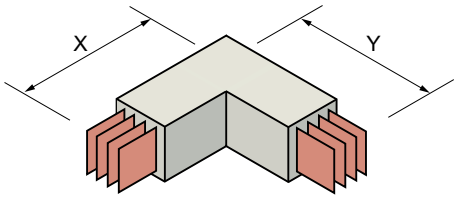


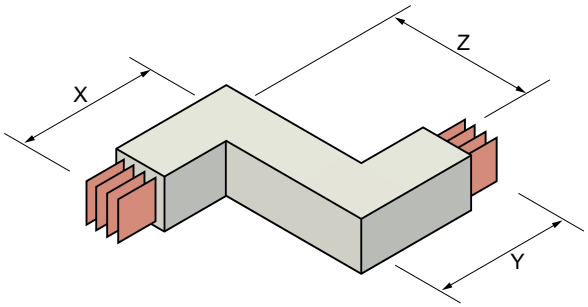
Figure 6-6 Adapter element (X = 1.0 m)

6.2.6 Junction units

Junction units for horizontal installation



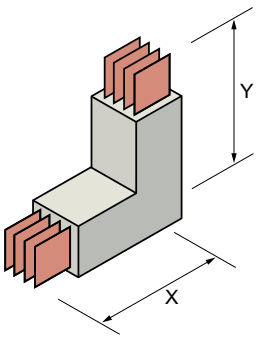
Elbow LR....-E(-1.0/-1.5)



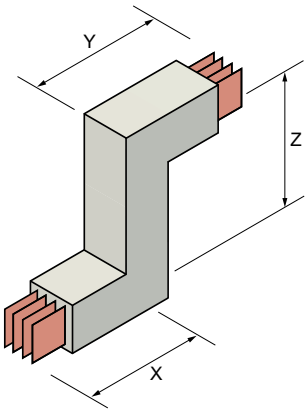
Z unit LR....-ZE

Length	System	Type
X = 0.30...1.20 m Y = 0.30...1.20 m	LR.01 to LR.29	LR....-E(-1.0/-1.5)
X/Y = 0.30 m Z = 0.01...0.60 m	LR.01 to LR.29	Z unit LR....-ZE

Junction units for horizontal and vertical installation

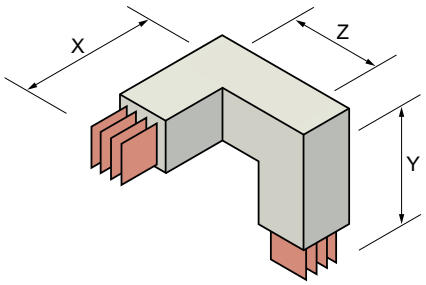


Knee LR....-K(-1.0/-1.5)

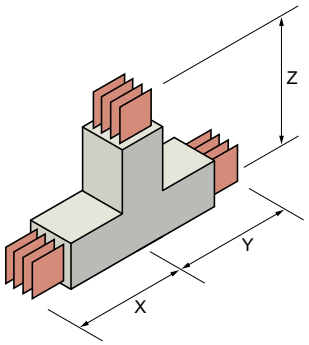


Z unit LR....-ZK

Length	System	Type
X/Y = 0.35...1.15 m	LR.01 to LR.09	LR....-K(-1.0/-1.5)
X/Y = 0.50...1.00 m	LR.27 to LR.29	
X/Y = 0.35 m Z = 0.01...0.70 m	LR.01 to LR.09	LR....-ZK
X/Y = 0.50 m Z = 0.01...1.00 m	LR.27 to LR.29	



Offset knee LR...-XL



T unit LR....-TV(-2.0)

Length	System	Type
X/Y = 0.35 m Z = 0.09...0.70 m	LR.01 to LR.09	LR....-XL
X/Y = 0.50 m Z = 0.25...1.00 m	LR.27 to LR.29	
X/Y = 0.35...1.15 m Z = 0.35...0.50 m	LR.01 to LR.09	LR....-TV(-2.0)
X/Y = 0.50...1.00 m Z = 0.50 m	LR.27 to LR.29	

6.2.7 Distribution board connection for Siemens power distribution boards

For the LR system, an LX connection unit in conjunction with an LR adapter element can be used to achieve a type-tested link to Siemens power distribution boards.

6.2.8 Connection unit for non-Siemens distribution boards

If you wish to connect the busbar trunking system to a non-Siemens distribution board, you can establish this connection using an LR....-T. connection unit for non-Siemens distribution boards. The connection unit is built into the distribution board and serves as an interface to the copper connections of the distribution system.

Versions

Aluminium or copper conductors are used for connection units for non-Siemens distribution boards. The rated currents up to a maximum of 6150 A correspond to the data in the Technical data section. The required conductor cross sections for copper connections are also listed in the Technical data section.

Installing the connection unit

The connections in the distribution board must be copper-plated by the board manufacturer or in compliance with that manufacturer's specifications. The board manufacturer must ensure that the required short-circuit rating is achieved and the permissible temperature limit of the non-Siemens connection unit is not exceeded.

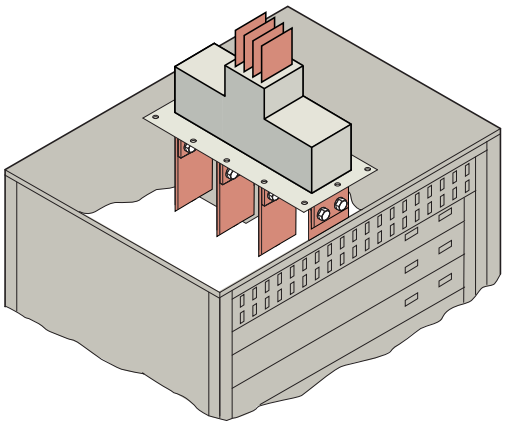


Figure 6-7 Connection unit for non-Siemens distribution boards

The dimensions correspond to those of the incoming cable connection units.

6.2.9 Connection unit for transformers and distribution boards

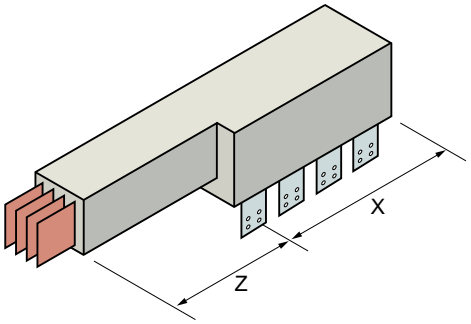
The wide variety of transformer types reflects the variety of rated currents and the different phase sequences and clearances.

This type variety requires high flexibility as regards transformer connection in busbar trunking systems.

The universal connection unit can also be used to connect distribution boards.

For LR busbar trunking systems up to 6150 A, transformer connection units are available with busbar connection on the side (LR....-TC, -TD or -TE) and on the top (LR....-TJ, -TG, -TM, -TK or -TX).

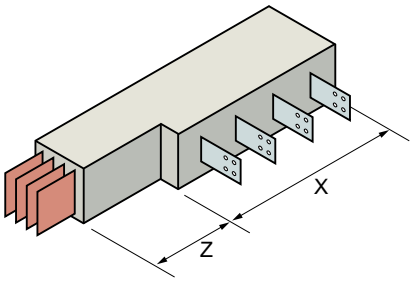
Busbar connection on the side and customer connection on the bottom



LR.....-TE(-F)

Length	System
X ≤ 0.70 m Z = 0.30...0.50 m	LR.01 to LR.09
X ≤ 1.00 m Z = 0.30...0.50 m	LR.27 to LR.29

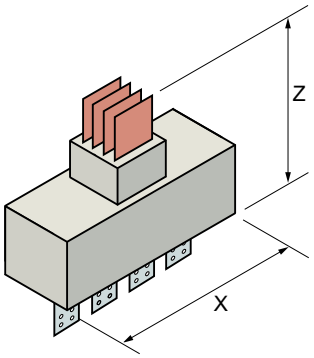
Busbar connection on the side and customer connection on the side



LR.....-TC(-F)

Length	System
X ≤ 0.40…0.70 m (4L), 0.50…0.70 m (5L) Z = 0.30...0.50 m	LR.01 to LR.29

Busbar connection on the top and customer connection on the bottom



LR.....-TX(-F)

Length	System
X ≤ 0.70 m Z = 0.50 m	LR.01 to LR.09
X ≤ 1.00 m Z = 0.70 m	LR.27 to LR.29

The phase clearances can be selected up to 750 mm.

Minimum phase clearance: Tag width + 25 mm

The sequence of the connection tags from conductors L1, L2, L3, N (PEN) and PE can be freely selected.

6.2.10 Incoming cable connection unit

If power needs to be supplied to the busbar trunking system via cables, you should use an LR....-KE incoming cable connection unit.

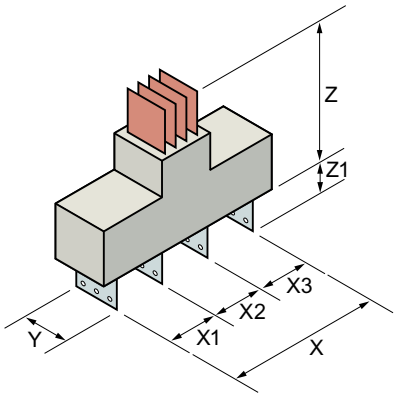


Figure 6-8 Incoming cable connection unit

Design	Size
4-conductor	X = 0.40 m Z = 0.30 m Z_1 = 0.06 m
5-conductor	X = 0.50 m Z = 0.30 m Z_1 = 0.06 m

Tags

Clearance	Width	Type
$X_1 = X_2 = X_3$ = 0.10 m	Y = 0.06 m	LR.01 to LR.03
	Y = 0.09 m	LR.04
	Y = 0.11 m	LR.05
	Y = 0.12 m	LR.06
	Y = 0.16 m	LR.07
	Y = 0.19 m	LR.08
	Y = 0.21 m	LR.09 to LR.29

You can connect single-core or multi-core cables. You can connect cross sections up to 300 mm^2 (bolted connection) directly to the incoming cable connection unit bars.

The cable connections are moulded to the tags on site once the cables have been connected. A moulding cast and cast resin mix are included in the scope of supply for this purpose.

6.2.11 Tap-offs for power distribution

The LR system has been designed for power transmission. However, power tap-offs for loads can be created by adding straight trunking units with junction points and corresponding junction boxes [1] to the LR run.

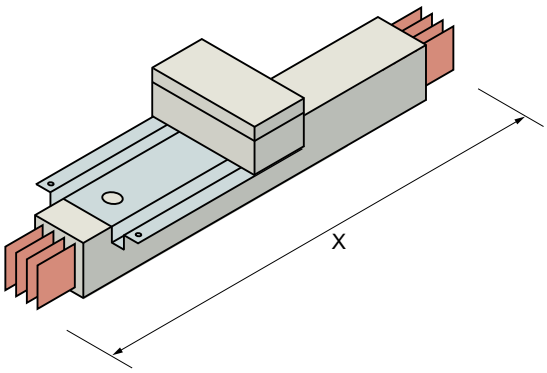


Figure 6-9 Straight trunking unit with tap-off unit

X = 0.50...3.00 m

The tap-off unit permits rated currents of up to 630 A. An equipment compartment (dashed line to the right of the tap-off unit) is built onto the tap-off unit. Project-specific switchgear (e.g. circuit breakers) is installed in the compartment and connected - both electrically and mechanically - to the tap-off unit.

Tap-off units are not designed for connection whilst the LRC system is live.

All other characteristics and technical data can only be provided on request for specific projects.

[1] Junction boxes are only available on request

6.2.12 Additional equipment

Joint block

The joint block is used for the trunking units' electrical and mechanical connections. LR trunking units are usually supplied without joint units (junction blocks or monoblocks, as they are also known). Accordingly, you need to make provision to plan and order joint blocks separately as appropriate for the number of trunking unit connections.

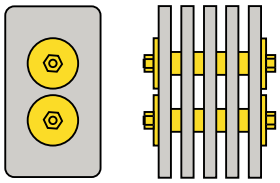
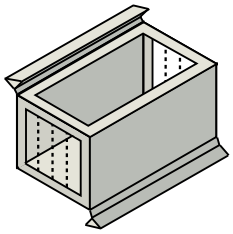


Figure 6-10 Joint unit

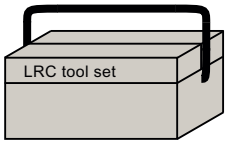
Accessories for busbar connections with joint blocks

Once the electrical link with the joint block has been established, it needs to be cast with epoxy resin. For this purpose, moulding casts, cast resin mix, separators and various tools are provided as accessories.



Casting mould

Cast resin mix



Tool set

Fixing brackets for horizontal installation

Various types of fixing bracket are available:

- Mounting position: edgewise or flat
- Mounting characteristic: run supported or fixed.

The standard supporting brackets are:

- LR..-BHF type for edgewise mounting
- LR..-BHH type for flat mounting

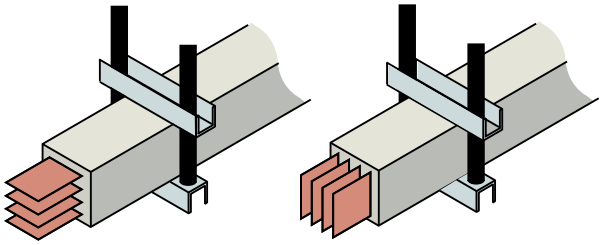


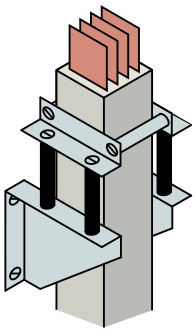
Figure 6-11 Flat (left) and edgewise (right) mounting position

The fixed points, as they are called, are created using long run lengths in conjunction with expansion compensation units.

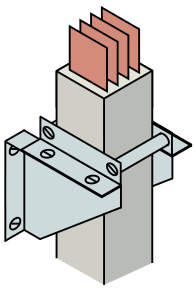
Fixing brackets for vertical installation

Various types of bracket have to be used to install vertical busbar runs:

- Spring clamp to carry the weight of the run, type LR..-BV.
- Sliding bracket to guide the run in the prescribed position, type LR..-BG.
- Fixed points to fix the run to the building structure, type LR..-BF.



LR..-BVW (wall mounting)



LR..-BF

6.3 Technical data

6.3.1 LR general data

Standards and regulations	DIN EN 60439-1 and DIN EN 60439-2
Rated insulation voltage [1] U_i [V]	AC 1000
Overvoltage category/pollution degree	III/3
Rated insulation voltage [1] U_e [V]	AC 1000
Frequency [Hz]	50 ... 60
Rated operational current I_e [A]	400 … 4600 (LRA) 630 ... 6150 (LRC)
Resistance to extreme climates	Damp heat (constant), to IEC 60068-2-78
	Damp heat (cyclic), to IEC 60068-2-30
Ambient temperature [°C] *	-5 ...+40
Degree of protection acc. to IEC/EN 60529 (type 2)	
Busbar elements	IP68
Connection elements/tap-off units	IP68
Material	
Enclosure for busbar elements, connection elements	Epoxy resin
Busbars	Aluminium with copper coating (LRA) Copper (LRC)
Mounting positions	Horizontal edgewise, horizontal flat, vertical
Colour	Stone grey, similar to RAL 7030

Thermal characteristics

Ambient temperature [°C]	20	25	30	35	40	45	50	55	60
Conversion factor	1.15	1.10	1.05	1.00	0.96	0.89	0.84	0.78	0.72

[1] For power distribution when using junction boxes on request

6.3.2 Trunking units LRA..41 (4-pole, aluminium)

LRA		0141	0241	0341
Rated current I_e		400	630	800
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20 °C busbar temperature	0.161	0.121	0.081
Reactance X_{20} [mΩ/m]		0.050	0.042	0.026
Impedance Z_{20} [mΩ/m]		0.169	0.128	0.085
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.176	0.142	0.096
Reactance X_{warm} [mΩ/m]		0.050	0.042	0.026
Impedance Z_{warm} [mΩ/m]		0.178	0.151	0.102
Resistance R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.353	0.284	0.193
Reactance X_F [mΩ/m]		0.175	0.100	0.155
Impedance Z_F [mΩ/m]		0.394	0.301	0.247
Resistance R_0 PEN [mΩ/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.470	0.379	0.257
Reactance X_0 PEN [mΩ/m]		0.609	0.509	0.529
Impedance Z_0 PEN [mΩ/m]		0.769	0.634	0.588
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		24	24	55.7
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		12	12	26.5
Conductor material		Aluminium		
Conductor cross-section PEN [mm^2]		176	236	354
Conductor cross-section of active conductors [mm^2]		176	236	354
Fire load [kWh/m]		13.01	12.59	11.76
Fixing distances [m]		1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		21.89	22.08	22.46

LRA		0441	0541	0641	0741	0841	0941
Rated current I_e		1000	1200	1400	1600	2000	2500
Degree of protection		IP68					
Resistance R_{20} [mΩ/m]	At 50 Hz and +20°C busbar temperature	0.060	0.048	0.040	0.030	0.024	0.020
Reactance X_{20} [mΩ/m]		0.055	0.050	0.042	0.046	0.031	0.029
Impedance per unit length Z_{20} [mΩ/m]		0.081	0.070	0.058	0.055	0.040	0.035
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.074	0.059	0.050	0.036	0.029	0.026
Reactance X_{warm} [mΩ/m]		0.055	0.050	0.042	0.046	0.031	0.029
Impedance per unit length Z_{warm} [mΩ/m]		0.094	0.079	0.066	0.059	0.043	0.038
Resistance per unit length R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.149	0.119	0.099	0.073	0.060	0.051
Reactance per unit length X_F [mΩ/m]		0.147	0.118	0.098	0.091	0.116	0.118
Impedance per unit length Z_F [mΩ/m]		0.209	0.167	0.139	0.117	0.131	0.129
Resistance R_0 PEN[m Ω/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.198	0.159	0.132	0.097	0.080	0.068
Reactance X_0 PEN [mΩ/m]		0.355	0.284	0.237	0.220	0.212	0.204
Impedance per unit length Z_0 PEN [mΩ/m]		0.407	0.325	0.271	0.240	0.227	0.215
Short-circuit rating							
Rated impulse withstand current I_{pk} [kA]		55.7	117	117	143	143	143
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		26.5	53	53	65	65	65
Conductor material		Aluminium					
Conductor cross-section PEN [mm^2]		472	592	712	944	1184	1424
Conductor cross-section of active conductors [mm^2]		472	592	712	944	1184	1424
Fire load [kWh/m]		15.72	19.19	21.32	27.51	32.05	36.68
Fixing distances [m]		1.5	1.5	1.5	1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		29.74	34.66	38.81	48.87	58.17	67.97

Technical data of the busbar elements

LRA		2741	2841	2941
Rated current I_e		3200	4000	4600
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.015	0.012	0.010
Reactance X_{20} [mΩ/m]		0.024	0.026	0.023
Impedance per unit length Z_{20} [mΩ/m]		0.028	0.029	0.025
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.019	0.015	0.013
Reactance X_{warm} [mΩ/m]		0.024	0.026	0.023
Impedance per unit length Z_{warm} [mΩ/m]		0.031	0.030	0.026
Resistance per unit length R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.038	0.030	0.025
Reactance per unit length X_F [mΩ/m]		0.093	0.084	0.068
Impedance per unit length Z_F [mΩ/m]		0.100	0.089	0.073
Resistance R_0 PEN[m Ω/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.051	0.041	0.034
Reactance X_0 PEN [mΩ/m]		0.197	0.192	0.167
Impedance per unit length Z_0 PEN [mΩ/m]		0.204	0.196	0.170
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		220	220	220
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		100	100	100
Conductor material		Aluminium		
Conductor cross-section PEN (mm^2)		1889	2368	2849
Conductor cross-section of active conductors [mm^2]		1889	2368	2849
Fire load [kWh/m]		55.01	64.11	73.36
Fixing distances [m]		1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		97.74	116.34	135.95

Resistance per unit length from measurements/derivations

6.3.3 Trunking units LRA..51 (5-pole, aluminium)

LRA		0151	0251	0351
Rated current I_e		400	630	800
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.161	0.121	0.081
Reactance X_{20} [mΩ/m]		0.050	0.042	0.026
Impedance per unit length Z_{20} [mΩ/m]		0.169	0.128	0.085
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.176	0.142	0.096
Reactance X_{warm} [mΩ/m]		0.050	0.042	0.026
Impedance per unit length Z_{warm} [mΩ/m]		0.178	0.151	0.102
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.353	0.284	0.193
Reactance per unit length X_F PE [mΩ/m]		0.157	0.090	0.140
Impedance per unit length Z_F PE [mΩ/m]		0.386	0.298	0.238
Resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.353	0.284	0.193
Reactance per unit length X_F N [mΩ/m]		0.175	0.100	0.155
Impedance per unit length Z_F N [mΩ/m]		0.394	0.301	0.209
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.447	0.360	0.244
Reactance 1 X_0 N [mΩ/m]		0.974	0.814	0.846
Impedance per unit length 1 Z_0 N [mΩ/m]		1.071	0.890	0.880
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.470	0.379	0.257
Reactance 2 X_0 PE [mΩ/m]		0.609	0.509	0.529
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.769	0.634	0.588
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		24	24	55.7
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		12	12	26.5
Conductor material		Aluminium		
Conductor cross-section N [mm^2]		176	236	354
Conductor cross-section of active conductors [mm^2]		176	236	354
Conductor cross-section PE [mm^2]		176	236	354
Fire load [kWh/m]		12.70	12.17	11.13
Fixing distances [m]		1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		22.03	22.27	22.75

LRA		0451	0551	0651	0751	0851	0951
Rated current I_e		1000	1200	1400	1600	2000	2500
Degree of protection		IP68					
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.060	0.048	0.040	0.030	0.024	0.020
Reactance X_{20} [mΩ/m]		0.055	0.050	0.042	0.046	0.031	0.029
Impedance per unit length Z_{20} [mΩ/m]		0.081	0.070	0.058	0.055	0.040	0.035
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbar	0.074	0.059	0.050	0.036	0.029	0.026
Reactance X_{warm} [mΩ/m]		0.055	0.050	0.042	0.046	0.031	0.029
Impedance per unit length Z_{warm} [mΩ/m]		0.094	0.079	0.066	0.059	0.043	0.038
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.149	0.119	0.099	0.073	0.060	0.051
Reactance per unit length X_F PE [mΩ/m]		0.132	0.106	0.088	0.082	0.105	0.106
Impedance per unit length Z_F PE [mΩ/m]		0.199	0.159	0.133	0.110	0.121	0.118
AC resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.149	0.119	0.099	0.073	0.060	0.051
Reactance per unit length X_F N [mΩ/m]		0.147	0.118	0.098	0.091	0.116	0.118
Impedance per unit length Z_F N [mΩ/m]		0.167	0.167	0.139	0.117	0.131	0.129
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (N) to DIN VDE 0102, IEC 909	0.188	0.151	0.126	0.092	0.076	0.065
Reactance per unit length 1 X_0 N [mΩ/m]		0.568	0.454	0.379	0.352	0.339	0.326
Impedance per unit length Z_0 N [mΩ/m]		0.598	0.479	0.399	0.364	0.348	0.333
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.198	0.159	0.132	0.097	0.080	0.068
Reactance per unit length 2 X_0 PE [mΩ/m]		0.355	0.284	0.237	0.220	0.212	0.204
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.407	0.325	0.271	0.240	0.227	0.215
Short-circuit rating							
Rated short-time withstand current I_{pk} [kA]		55.7	117	117	143	143	143
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		26.5	53	53	65	65	65
Conductor material		Aluminium					
Conductor cross-section N [mm^2]		472	592	712	944	1184	1424
Conductor cross-section of active conductors [mm^2]		472	592	712	944	1184	1424
Conductor cross-section PE [mm^2]		472	592	712	944	1184	1424
Fire load [kWh/m]		18.69	22.84	25.33	32.71	38.04	43.48
Fixing distances [m]		1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		34.26	40.04	45.04	56.79	67.80	79.30

LRA		2751	2851	2951
Rated current I_e [A]		3200	4000	4600
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.015	0.012	0.010
Reactance X_{20} [mΩ/m]		0.024	0.026	0.023
Impedance per unit length Z_{20} [mΩ/m]		0.028	0.029	0.025
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.019	0.015	0.013
Reactance X_{warm} [mΩ/m]		0.024	0.026	0.023
Impedance per unit length Z_{warm} [mΩ/m]		0.031	0.030	0.026
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.038	0.030	0.025
Reactance per unit length X_F PE [mΩ/m]		0.084	0.076	0.061
Impedance per unit length Z_F PE [mΩ/m]		0.092	0.082	0.066
Resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.038	0.030	0.025
Reactance per unit length X_F N [mΩ/m]		0.093	0.084	0.068
Impedance per unit length Z_F N [mΩ/m]		0.100	0.089	0.073
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.048	0.039	0.032
Reactance 1 X_0 N [mΩ/m]		0.316	0.307	0.267
Impedance per unit length 1 Z_0 N [mΩ/m]		0.319	0.310	0.269
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.051	0.041	0.034
Reactance 2 X_0 PE [mΩ/m]		0.197	0.192	0.167
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.204	0.196	0.170
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		220	220	220
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		100	100	100
Conductor material		Aluminium		
Conductor cross-section N (mm^2)		1889	2368	2849
Conductor cross-section of active conductors [mm^2]		1889	2368	2849
Conductor cross-section PE [mm^2]		1889	2368	2849
Fire load [kWh/m]		65.43	76.08	86.96
Fixing distances [m]		1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		113.59	135.59	158.59

Resistance per unit length from measurements/derivations

6.3.4 Trunking units LRC..41 (4-pole, copper)

LRC		0141	0241	0341
Rated current I_e		630	800	1000
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.099	0.074	0.049
Reactance X_{20} [mΩ/m]		0.068	0.058	0.057
Impedance per unit length Z_{20} [mΩ/m]		0.120	0.094	0.075
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.119	0.093	0.062
Reactance X_{warm} [mΩ/m]		0.106	0.085	0.069
Impedance per unit length Z_{warm} [mΩ/m]		0.159	0.126	0.092
Resistance per unit length R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.197	0.15	0.117
Reactance per unit length X_F [mΩ/m]		0.231	0.191	0.16
Impedance per unit length Z_F [mΩ/m]		0.304	0.243	0.198
Resistance R_0 PEN[m Ω/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.275	0.217	0.173
Reactance X_0 PEN [mΩ/m]		0.269	0.227	0.193
Impedance per unit length Z_0 PEN [mΩ/m]		0.385	0.313	0.259
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		48	48	80
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		23	23	38
Conductor material		Copper		
Conductor cross-section PEN [mm^2]		176	236	354
Conductor cross-section of active conductors [mm^2]		176	236	354
Fire load [kWh/m]		13.01	12.59	11.76
Fixing distances [m]		1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		25.24	26.93	30.31

LRC		0441	0541	0641	0741	0841	0941
Rated current I_e		1350	1600	1700	2000	2500	3200
Degree of protection		IP68					
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.039	0.031	0.026	0.021	0.017	0.015
Reactance X_{20} [mΩ/m]		0.051	0.046	0.038	0.034	0.031	0.029
Impedance per unit length Z_{20} [mΩ/m]		0.065	0.056	0.046	0.040	0.035	0.033
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.050	0.040	0.031	0.025	0.020	0.018
Reactance X_{warm} [mΩ/m]		0.051	0.046	0.038	0.034	0.031	0.029
Impedance per unit length Z_{warm} [mΩ/m]		0.071	0.061	0.049	0.042	0.037	0.034
Resistance per unit length R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.094	0.075	0.060	0.048	0.038	0.031
Reactance per unit length X_F [mΩ/m]		0.136	0.116	0.098	0.084	0.071	0.060
Impedance per unit length Z_F [mΩ/m]		0.165	0.138	0.115	0.096	0.081	0.068
Resistance R_0 PEN[m Ω/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.142	0.116	0.095	0.078	0.064	0.053
Reactance X_0 PEN [mΩ/m]		0.164	0.139	0.119	0.101	0.086	0.073
Impedance per unit length Z_0 PEN [mΩ/m]		0.217	0.182	0.152	0.128	0.107	0.090
Short-circuit rating							
Rated impulse withstand current I_{pk} [kA]		80	140	140	140	176	176
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		38	65	65	65	80	80
Conductor material		Copper					
Conductor cross-section PEN [mm^2]		472	592	712	944	1184	1424
Conductor cross-section of active conductors [mm^2]		472	592	712	944	1184	1424
Fire load [kWh/m]		15.72	19.19	21.32	27.51	32.05	36.68
Fixing distances [m]		1.5	1.5	1.5	1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		40.56	47.39	55.69	71.72	86.59	102.34

LRC		2741	2841	2941
Rated current I_e		4000	5000	6150
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.010	0.008	0.006
Reactance X_{20} [mΩ/m]		0.014	0.013	0.011
Impedance per unit length Z_{20} [mΩ/m]		0.017	0.015	0.013
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.013	0.010	0.008
Reactance X_{warm} [mΩ/m]		0.014	0.013	0.011
Impedance per unit length Z_{warm} [mΩ/m]		0.019	0.016	0.014
Resistance per unit length R_F [mΩ/m]	For 4-pole systems in the event of a fault in accordance with EN 60439-2 Annex N	0.022	0.018	0.014
Reactance per unit length X_F [mΩ/m]		0.054	0.046	0.039
Impedance per unit length Z_F [mΩ/m]		0.059	0.049	0.041
Resistance R_0 PEN[m Ω/m]	Zero impedance for 4-pole systems to DIN VDE 0102, IEC 909	0.046	0.038	0.031
Reactance X_0 PEN [mΩ/m]		0.067	0.057	0.048
Impedance per unit length Z_0 PEN [mΩ/m]		0.082	0.068	0.057
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		220	220	220
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		100	100	100
Conductor material		Copper		
Conductor cross-section PEN (mm^2)		1889	2368	2849
Conductor cross-section of active conductors [mm^2]		1889	2368	2849
Fire load [kWh/m]		55.01	64.11	73.36
Fixing distances [m]		1.5	1.5	1.5
Weight (kg/m) (2 m length with clamped connection)		140.49	171.99	186.69

Resistance per unit length from measurements/derivations

6.3.5 Trunking units LRC..51 (5-pole, copper)

LRC		0151	0251	0351
Rated current I_e		630	800	1000
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.099	0.074	0.049
Reactance X_{20} [mΩ/m]		0.068	0.058	0.057
Impedance per unit length Z_{20} [mΩ/m]		0.120	0.094	0.075
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.119	0.093	0.062
Reactance X_{warm} [mΩ/m]		0.106	0.085	0.069
Impedance per unit length Z_{warm} [mΩ/m]		0.159	0.126	0.092
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.197	0.150	0.117
Reactance per unit length X_F PE [mΩ/m]		0.231	0.191	0.16
Impedance per unit length Z_F PE [mΩ/m]		0.304	0.243	0.198
Resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.197	0.150	0.117
Reactance per unit length X_F N [mΩ/m]		0.231	0.191	0.16
Impedance per unit length Z_F N [mΩ/m]		0.304	0.243	0.198
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.275	0.217	0.173
Reactance 1 X_0 N [mΩ/m]		0.269	0.227	0.193
Impedance per unit length 1 Z_0 N [mΩ/m]		0.385	0.313	0.259
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.275	0.217	0.173
Reactance 2 X_0 PE [mΩ/m]		0.269	0.227	0.193
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.385	0.313	0.259
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		48	48	80
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		23	23	38
Conductor material		Copper		
Conductor cross-section N [mm^2]		176	236	354
Conductor cross-section of active conductors [mm^2]		176	236	354
Conductor cross-section PE [mm^2]		176	236	354
Fire load [kWh/m]		12.70	12.17	11.13
Fixing distances [m]		1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		26.70	28.82	33.04

LRC		0451	0551	0651	0751	0851	0951
Rated current I_e		1350	1600	1700	2000	2500	3200
Degree of protection		IP68					
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.039	0.031	0.026	0.021	0.017	0.015
Reactance X_{20} [mΩ/m]		0.051	0.046	0.038	0.034	0.031	0.029
Impedance per unit length Z_{20} [mΩ/m]		0.065	0.056	0.046	0.040	0.035	0.033
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbar	0.050	0.040	0.031	0.025	0.020	0.018
Reactance X_{warm} [mΩ/m]		0.051	0.046	0.038	0.034	0.031	0.029
Impedance per unit length Z_{warm} [mΩ/m]		0.071	0.061	0.049	0.042	0.037	0.034
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.094	0.075	0.060	0.048	0.038	0.031
Reactance per unit length X_F PE [mΩ/m]		0.150	0.127	0.108	0.092	0.078	0.066
Impedance per unit length Z_F PE [mΩ/m]		0.176	0.148	0.124	0.104	0.087	0.073
AC resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.094	0.075	0.060	0.048	0.038	0.031
Reactance per unit length X_F N [mΩ/m]		0.136	0.116	0.098	0.084	0.071	0.060
Impedance per unit length Z_F N [mΩ/m]		0.165	0.138	0.115	0.096	0.081	0.068
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (N) to DIN VDE 0102, IEC 909	0.163	0.134	0.110	0.090	0.074	0.060
Reactance per unit length 1 X_0 N [mΩ/m]		0.328	0.279	0.237	0.201	0.171	0.146
Impedance per unit length Z_0 N [mΩ/m]		0.366	0.309	0.261	0.221	0.186	0.158
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.142	0.116	0.095	0.078	0.064	0.053
Reactance per unit length 2 X_0 PE [mΩ/m]		0.164	0.139	0.119	0.101	0.086	0.073
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.217	0.182	0.152	0.128	0.107	0.090
Short-circuit rating							
Rated short-time withstand current I_{pk} [kA]		80	140	140	140	176	176
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		38	65	65	65	80	80
Conductor material		Copper					
Conductor cross-section N [mm^2]		472	592	712	944	1184	1424
Conductor cross-section of active conductors [mm^2]		472	592	712	944	1184	1424
Conductor cross-section PE [mm^2]		472	592	712	944	1184	1424
Fire load [kWh/m]		18.69	22.84	25.33	32.71	38.04	43.48
Fixing distances [m]		1.5	1.5	1.5	1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		48.77	58.09	67.03	86.77	104.94	123.99

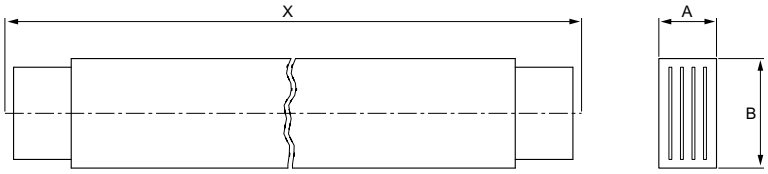
LRC		2751	2851	2951
Rated current I_e [A]		4000	5000	6150
Degree of protection		IP68		
Resistance R_{20} [mΩ/m]	At 50 Hz and +20° C busbar temperature	0.010	0.008	0.006
Reactance X_{20} [mΩ/m]		0.014	0.013	0.011
Impedance per unit length Z_{20} [mΩ/m]		0.017	0.015	0.013
Resistance R_{warm} [mΩ/m]	At 50 Hz and final heating of busbars	0.013	0.010	0.008
Reactance X_{warm} [mΩ/m]		0.014	0.013	0.011
Impedance per unit length Z_{warm} [mΩ/m]		0.019	0.016	0.014
AC resistance per unit length R_F PE [mΩ/m]	For 5-pole systems (PE) in the event of a fault in accordance with EN 60439-2 Annex N	0.022	0.018	0.014
Reactance per unit length X_F PE [mΩ/m]		0.059	0.050	0.043
Impedance per unit length Z_F PE [mΩ/m]		0.063	0.053	0.045
Resistance per unit length R_F N [mΩ/m]	For 5-pole systems (N) in the event of a fault in accordance with EN 60439-2 Annex N	0.022	0.018	0.014
Reactance per unit length X_F N [mΩ/m]		0.054	0.046	0.039
Impedance per unit length Z_F N [mΩ/m]		0.059	0.049	0.041
Resistance 1 R_0 N [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.053	0.043	0.036
Reactance 1 X_0 N [mΩ/m]		0.134	0.114	0.097
Impedance per unit length 1 Z_0 N [mΩ/m]		0.144	0.122	0.103
Resistance 2 R_0 PE [mΩ/m]	Zero impedance for 5-pole systems (PE) to DIN VDE 0102, IEC 909	0.046	0.038	0.031
Reactance 2 X_0 PE [mΩ/m]		0.067	0.057	0.048
Impedance per unit length 2 Z_0 PE [mΩ/m]		0.082	0.068	0.057
Short-circuit rating				
Rated impulse withstand current I_{pk} [kA]		220	220	220
Rated short-time withstand current I_{cw} (t = 1 s) [kA]		100	100	100
Conductor material		Copper		
Conductor cross-section N (mm^2)		1889	2368	2849
Conductor cross-section of active conductors [mm^2]		1889	2368	2849
Conductor cross-section PE [mm^2]		1889	2368	2849
Fire load [kWh/m]		65.43	76.08	86.96
Fixing distances [m]		1.5	1.5	1.5
Weight (2 m length with clamped connection) [kg/m]		170.30	208.77	264.47

Resistance per unit length from measurements/derivations

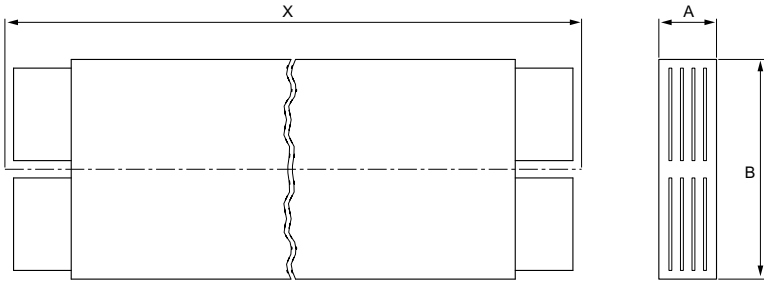
6.4 Dimension drawings

4-conductor system

LR.0141 to LR.0941



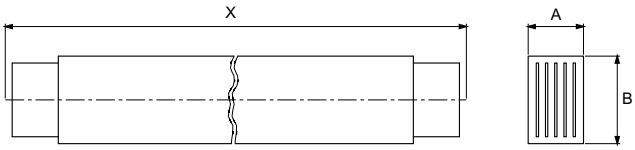
LR.2741 to LR.2941



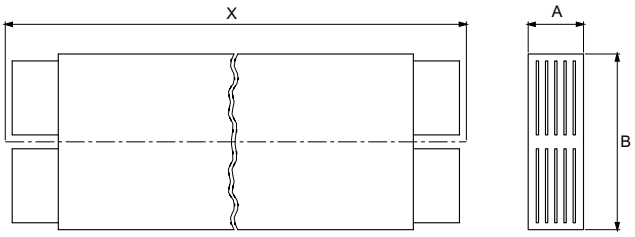
System	A [mm]	B [mm]	x [mm]
LR.0141	90	90	300 ... 3000
LR.0241			
LR.0341			
LRC.441	100	110	
LR.0541		130	
LR.0641		150	
LR.0741		190	
LR.0841		230	
LR.0941		270	
LR.2741		380	
LR.2841		460	
LR.2941		540	

5-conductor system

LR.0151 to LR.0951



LR.2751 to LR.2951



System	A [mm]	B [mm]	x [mm]
LR.0151	90	90	300 ... 3000
LR.0251			
LR.0351			
LR.0451	120	110	
LR.0551		130	
LR.0651		150	
LR.0751		190	
LR.0851		230	
LR.0951		270	
LR.2751		380	
LR.2851		460	
LR.2951		540	

Further information about planning 7

7.1 Dimensioning and selection

7.1.1 Determining the voltage drop

Formula for voltage drop

With long trunking runs it may be necessary to calculate the voltage drop:

$$\Delta U = k \cdot \sqrt{3} \cdot I_B \cdot l \cdot \left(R_1 \cdot \cos\varphi + X_1 \cdot \sin\varphi\right) \cdot 10^{-3}$$

ΔU = voltage drop (V)
I_B = rated current (A)
l = total length of system (m)
k = load distribution factor
R_1 = ohmic resistance (mΩ/m) with busbar final heating
X_1 = inductive resistance (mΩ/m) with busbar final heating
$\cos \varphi$ = power factor

The load distribution factor k for calculating the voltage drop at the end of the busbar trunking system is defined as follows:

- k = 1, if the load is concentrated at the end of the busbar trunking system (power transmission).
- k = (n +1)/(2 x n), if the load is distributed across n taps.

To calculate the voltage drop in the distance d between the start of a tap and the start of the busbar system, proceed as follows:

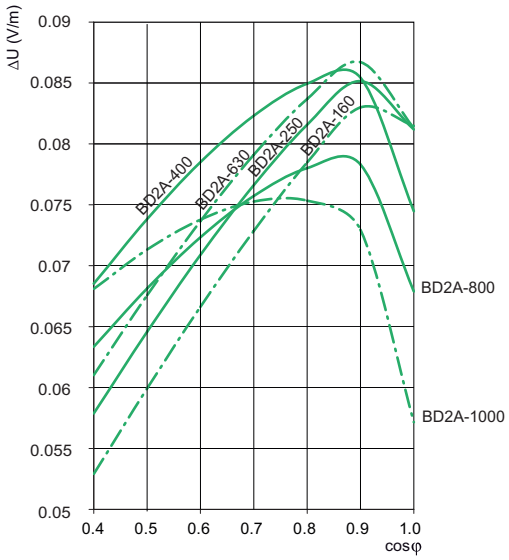
- k = (2 x n + 1 – n x d/L)/(2 x n)

Voltage drop diagrams

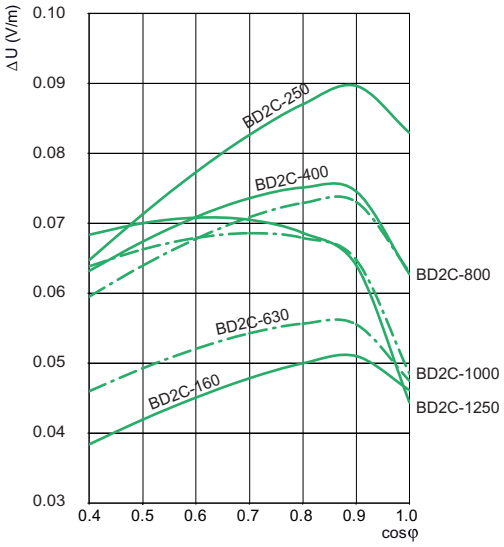
The following diagrams illustrate the voltage drop on the BD2, LD, LX and LR systems

- taking into account the final heating resistances (in accordance with EN 60439-2)
- with a load distribution factor
  - k = 1 for LD, LX and LR
  - k = 0.5 for BD2
- at rated current load. (In the case of a different current diversity factor, the value of the curve must be multiplied by the appropriate distribution factor.)

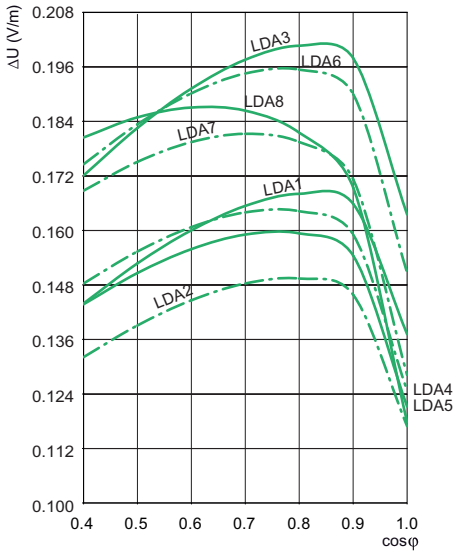
For systems with unevenly distributed loads, we recommend the SIMARIS design program for calculating short circuits and load flows (see Tools and services).



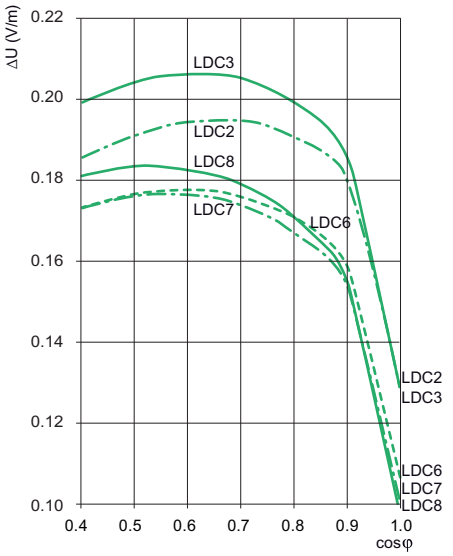
Voltage drop BD2A



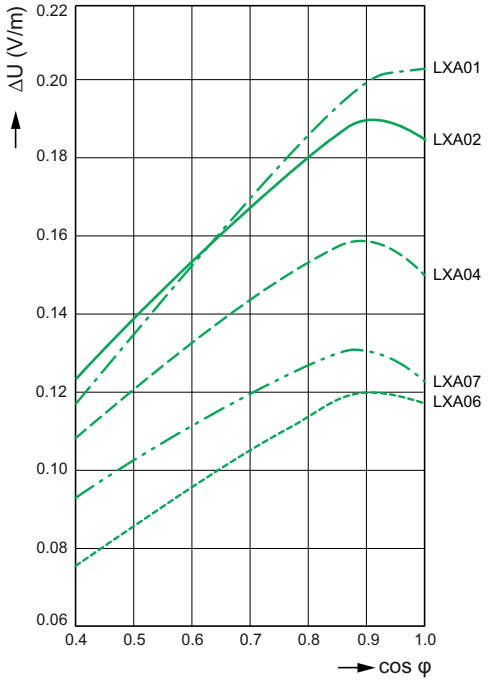
Voltage drop BD2C



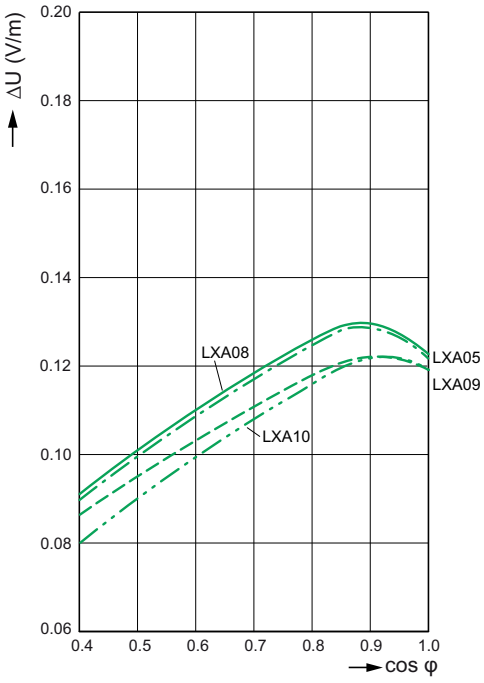
Voltage drop LDA



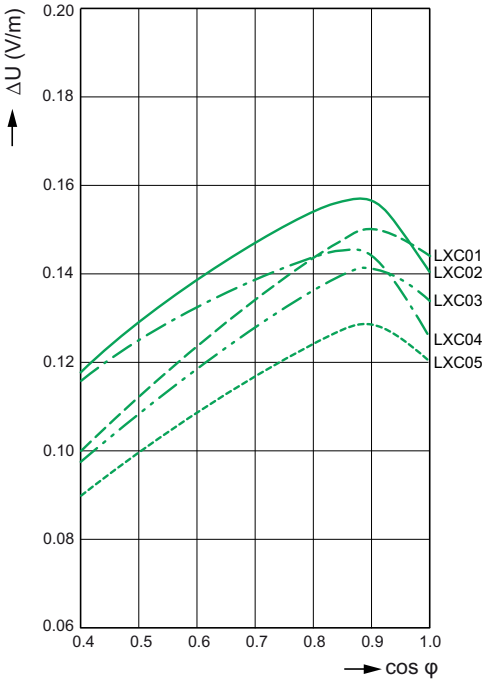
Voltage drop LDC



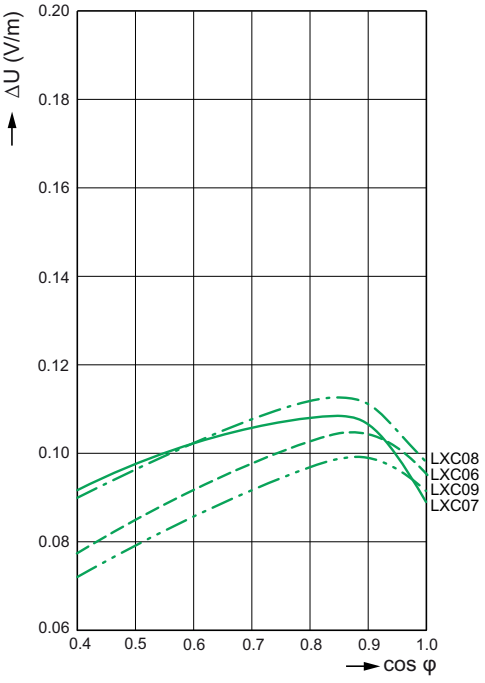
Voltage drop LXA



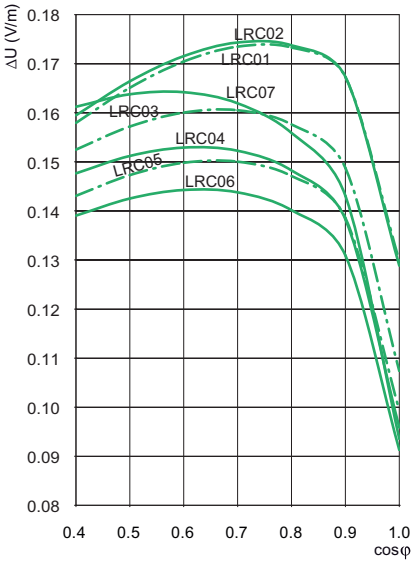
Voltage drop LXA



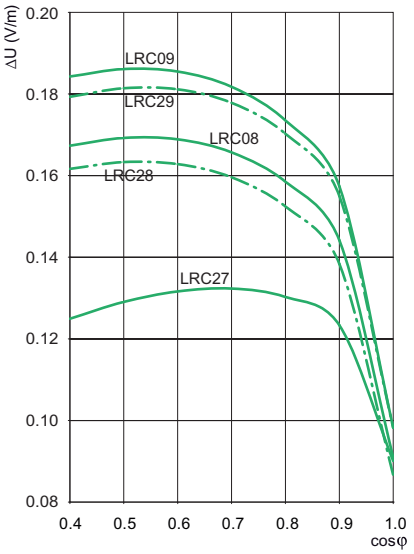
Voltage drop LXC



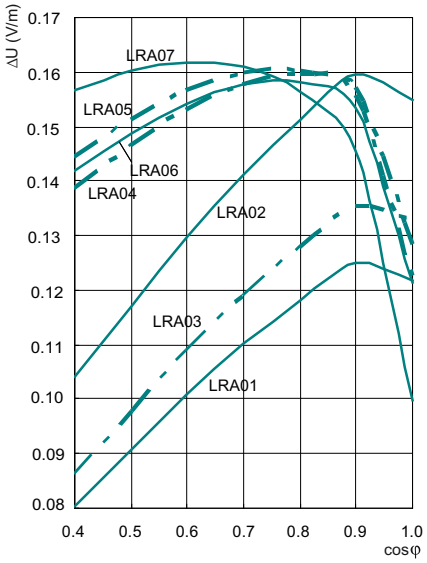
Voltage drop LXC



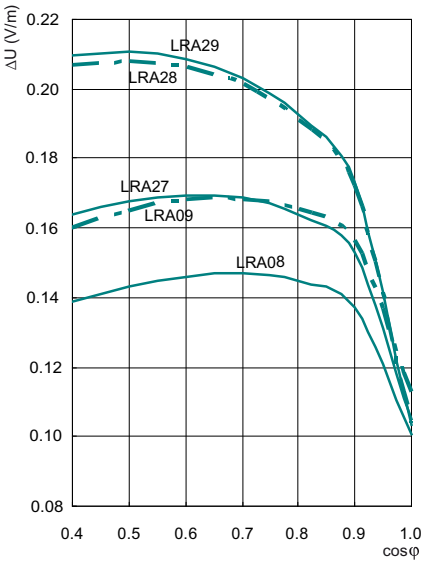
Voltage drop LRC01 to LRC07



Voltage drop LRC08 to LRC29



Voltage drop LRA01 to LRA07



Voltage drop LRA08 to LRA29

7.1.2 Overload protection and short-circuit protection

Busbar trunking systems need to be protected against short circuits and overloads. Fuses and circuit breakers are available for use as protective devices. With the selection of these protective devices the level of the expected short-circuit currents, selectivity requirements or operating and signalling functions are also factors for consideration.

When you decide on your short-circuit protection via fuses and circuit breakers you must not exceed the specified short-circuit ratings of the busbar trunking systems. It depends on the level of expected short-circuit current, whether a current limiting protective device is required and what short-circuit breaking capacity the protective device must have..

An overview of the circuit breakers which are able to provide short-circuit and overload protection (400 V and 50 Hz) for the corresponding busbar system appears in the table below [1].

The following applies:

$I''_k \leq I_{cc} \leq I_{cu}$

I''_k = anticipated short-circuit current at installation location

I_{cc} = rated conditional short-circuit current of the trunking run

I_{cu} = rated short-circuit breaking capacity of the circuit breaker

Type	Rated current	Circuit breakers with normal switching capacity	Rated short-circuit current [2]		Circuit breakers with strong switching capacity	Rated short-circuit current [2]		Circuit breakers with high switching capacity	Rated short-circuit current [2]	
	I_n		I_{cu}	I_{cc}		I_{cu}	I_{cc}		I_{cu}	I_{cc}
	A		kA	kA		kA	kA		kA	kA
BD2A(C)-160	160	3VL27 16-1...	40	20	3VL27 16-2...	70	20	3VL27 16-3...	100	20
BD2A(C)-250	250	3VL37 25-1...	40	40	3VL37 25-2...	70	50	3VL37 25-3...	100	50
BD2A(C)-400	400	3VL47 40-1...	45	45	3VL47 40-2...	70	45	3VL47 40-3...	100	45
BD2A(C)-630	630	3VL57 63-1DC36	45	45	3VL57 63-2DC36	70	70	3VL57 63-3DC36	100	100
BD2A(C)-800	800	3VL57 80-1SE36		50	3VL57 80-2SE36	70	70	3VL57 80-3SE36	100	100
BD2A(C)-1000	1000	3VL77 10-1SE36		50	3VL77 10-2SE36	70	60	3VL77 10-3SE36	100	60
BD2C-1250	1250	3VL77 12-1SE36		50	3VL77 12-2SE36	70	60	3VL77 12-3SE36	100	60

[1] The tripping characteristic of the protective device must be selected as appropriate for the short-circuit rating of the busbar systems, the type of system, the type and number of loads, as well as in line with country-specific regulations and type series. This table contains only a brief overview of BD2 on the use of circuit breakers for protection against short-circuit and overload, and it is intended only as a recommendation. We always recommend that you carry out a calculation using the SIMARIS design network tool to determine the appropriate protection. Please contact our TIP specialists for this purpose.

[2] The values for the conditional rated short-circuit current I_{cc} apply for the busbar trunking systems without taking account of the tap-off units.

7.1.3 Loop impedance

As the level of loop impedance is decisive as regards the magnitude of the single-pole short-circuit current, DIN VDE 0100-610 prescribes that loop impedance must be determined between:

- Phasel conductor and protective conductor or
- Phase conductor and PEN conductor

The value can be determined by means of:

- Measurements taken using measuring instruments
- Calculation
- Simulating the network in the network model

Impedance values for the BD2, LD, LX and LR busbar trunking systems are listed in the "Technical data" section; these can be used to calculate the loop impedances of a busbar system forming part of the total loop impedance.

Calculating the loop impedance of all contributory equipment in a system (incoming power supply, transformers, distribution boards, cable runs, etc.) takes a great deal of time and effort. In this regard, planning time and effort can be reduced significantly by using a dimensioning program such as SIMARIS design which stores the necessary data for most common electrical equipment in a database.

7.1.4 Degrees of protection for busbar trunking systems

Use in areas at risk of fire

In areas at risk of fire, in accordance with European standard HD 384.4.482 S1, increased requirements are placed on the degree of protection to be afforded for electrical equipment. In the event of a fire risk due to the nature of the materials being processed or stored, if it is possible that dust will accumulate, the minimum degree of protection must be equivalent to IP5X. If dust is not to be reckoned with, national regulations shall apply accordingly.

The risk prevention arm of the association of German insurers sets out the following requirements:

– In the event of a fire risk due to dust or/and fibres: IP5X degree of protection
– In the event of a fire risk due to other readily flammable solid foreign bodies with a diameter of 1 mm or more: IP4X degree of protection

SIVACON 8PS busbar trunking systems meet these requirements. They are therefore suitable for such applications.

7.1.5 Degrees of protection for electrical equipment in accordance with IEC / EN 60529

	1. code digit		2. code digit
	Protection against direct contact	**Protection against solid foreign bodies and dust**	**Protection against ingress of liquid**
IP00	No special protection	No special protection	No special protection
IP20	Against finger contact	Against solid bodies ≥ 12.5 mm	No special protection
IP34	Against tools	Against solid bodies ≥ 2.5 mm	No damage caused by splashwater
IP41	Against foreign objects	Against solid bodies ≥ 1 mm	No damage caused by vertically dripping water (Vertical drops)
IP43	Against foreign objects	Against solid bodies ≥ 1 mm	Protected against damage caused by water spray
IP54	Against foreign objects	Against hazardous dust deposits inside (Dust-tight)	No damage caused by splashwater
IP55	Against foreign objects	Against hazardous dust deposits inside (Dust-tight)	No damage caused by hosewater
IP65	Against foreign objects	Against penetration of dust (Dust-tight)	No damage caused by hosewater
IP66	Against foreign objects	Against penetration of dust (Dust-tight)	In the event of temporary immersion, ingress of water will have no harmful effects (Water jet)
IP67	Against foreign objects	Against penetration of dust (Dust-tight)	Water may not ingress in harmful quantities during immersion (Temporary immersion)
IP68	Against foreign objects	Against penetration of dust (Dust-tight)	Water may not ingress in harmful quantities during immersion for indefinite periods (Continuous immersion)

Protection against direct contact according to DIN EN 50274

These regulations must be complied with when dimensioning and laying out electrical equipment in electrical systems with rated voltages up to 1000 VAC or 1500 VDC with regard to protection against direct contact, insofar as actuators (pushbuttons, rockers, etc.) are located in the vicinity of touch-hazardous parts.

"Finger-proof" touch protection only applies to the actuator in the actuating direction. Measured from the central point, a clearance with a radius of r = 30 mm must be maintained between the actuator and touch-hazardous parts. IP20 degree of protection is more than "finger-proof" touch protection. It includes touch protection of electrical equipment from all directions. For devices with "finger-proof" touch protection and IP00 degree of protection, direct contact protection can be provided on request in the form of covers.

7.1.6 Distribution systems

Determining the protective measure and selecting the electrical equipment appropriate for your distribution system

TN systems

TN-S system: The neutral conductor and protective conductor function are separate throughout the system.

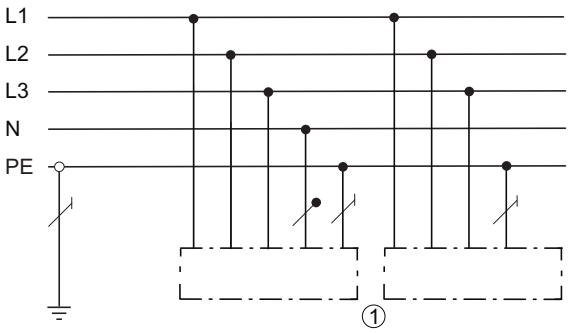


Figure 7-1 TN-S system

TN-C system: The neutral conductor and protective conductor function are combined throughout the system.

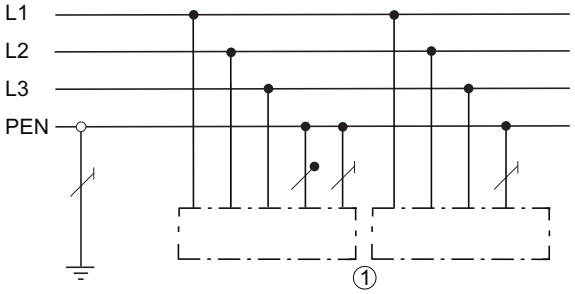


Figure 7-2 TN-C system

TN-C-S system: Hybrid neutral conductor and protective conductor function. In one part of the system they are combined, in the other part they are separate.

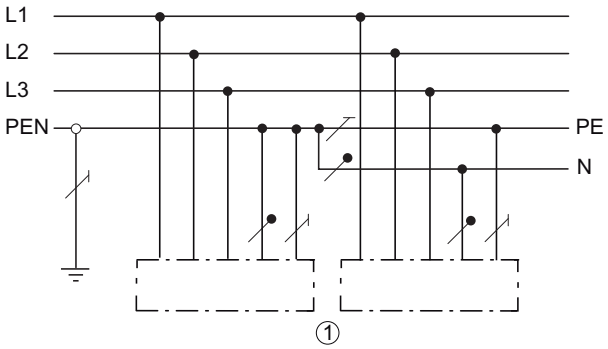


Figure 7-3 TN-C-S system

TT system

In TT systems, one point is directly earthed; the exposed parts of the electrical installation are connected to earth electrodes which are isolated from the system earth electrode.

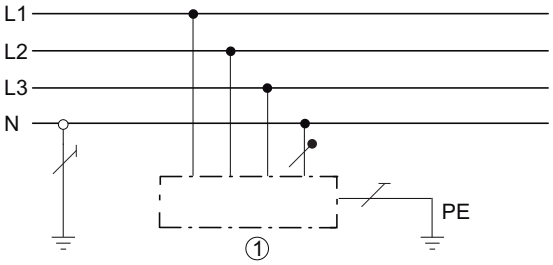


Figure 7-4 TT system

IT system

The IT system has no direct link between active conductors and earthed parts; the exposed parts of the electrical installation are earthed.

Today's IT systems feature protective measures in the form of a protective-conductor system.

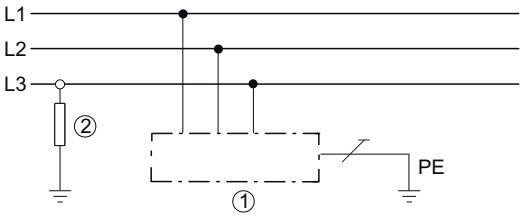


Figure 7-5 IT system

① Exposed part

② Impedance

First letter: Earthing condition of the incoming current source

T = Direct **earthing** of a point

I = Either **insulation** of all active parts from earth or connection between a point and earth via an impedance

Second letter: Earthing condition of the exposed parts of the electrical installation

T = Exposed part **directly earthed** regardless of whether or not a point in the power supply is earthed

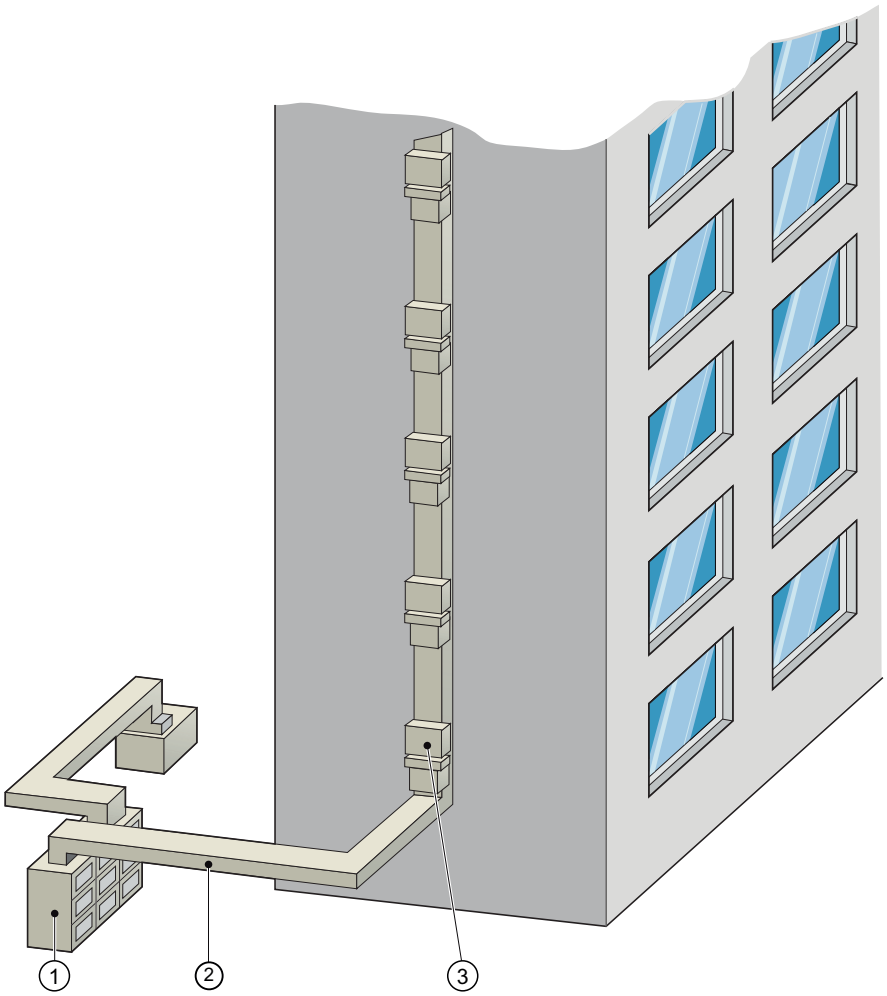
N = Exposed part linked directly to **system earth**, in alternating voltage systems, the earthed point is usually the star point.

Additional letters = Arrangement of the neutral conductor and the protective conductor

S = Neutral conductor and protective conductor functions via **separate** conductors

C = Neutral conductor and protective conductor functions **combined** in a single conductor (PEN)

7.2 Planning example



① Power distribution board
② Busbar trunking system
③ Tap-off point

Figure 7-6 Power supply for a high rise building

No. of floors	15 (of which 8 are residential units)
Effective installed loads per residential unit	26 kW
Rated operating voltage U_e	400 V
Power factor cos φ	0.9
Load factor α	0.6
Utilization factor β	0.5
Supply transformers	1 x 1250 kVA, u_k = 6%
Degree of protection	IP30/IP54
Grid type	TN-S

Determining the rated current per floor

$$I_{BS} = \frac{P_{inst} \cdot \alpha}{\sqrt{3} \cdot U_e \cdot \cos\varphi} \cdot 10^3$$

I_{nS} = rated current per floor (A)
U_e = rated operating voltage (V)
cos φ = power factor
P_{inst} = installed power rating (kW)
α = Rated diversity factor

$$I_{BS} = \frac{8 \cdot 26 \cdot 0.6}{\sqrt{3} \cdot 400 \cdot 0.9} \cdot 10^3 = 200A$$

Determining the rated current of the trunking run

$I_n = N \cdot I_{nS} \cdot \beta$

$I_n = 15 \cdot 200 \cdot 0.5 = 1500$ A

$I_n \leq I_e$

The rated diversity factor in accordance with EN60439-1 applies for the total number of loads and the demand factor or the type of load. In the absence of precise figures for the demand factor, reliable empirical values can be obtained from local utility companies. However, these vary from region to region. Average values are listed in the table below:

Type of load	β
Residential accommodation with electric ovens and water heaters	0.1...0.2
Off-peak storage heating	0.8...1
Lighting in office blocks and commercial buildings	0.7...0.9
Lifts and and general facilities	0.6...0.8
Conference rooms	0.6...0.8
Small offices	0.5...0.7
Large offices	0.4...0.8

In accordance with the system selection criteria based on technical data and areas of application in the "Planning principles" section, the LX high-voltage system is used in the planning for this example (power distribution in multi-storey buildings with primarily vertical trunking layout).

Combining the assessment criteria and calculations results in an LXA busbar system being selected with 5 conductors and full neutral conductor cross section, a current carrying capacity of 1600 A and a short-circuit rating of I_{cw} (t = 1 s) 60 kA.

Selected busbar system: **LXA0551**

Tap-off units with 3-pole 250 A fuse switch disconnectors (designed for use with NH1 fuse links) are used to supply power to the distribution boards on each floor.

Selected tap-off unit: **LX-AK5/FS250IEC-3**

7.3 Functional endurance

7.3.1 Applicable regulations

"Fire prevention devices and fire prevention measures" for electrical installations are required in particular in buildings of special types and used for special purposes. Examples of these types of building include hospitals and public buildings. DIN VDE 0100-560 relating to buildings and structures for public use and DIN VDE 0100-710 (previously DIN VDE 0107) relating to medical locations specify that the electrical installations in such buildings must maintain functional endurance for specific lengths of time even in the event of a fire. This requirement affects the following equipment in particular:

- Fire alarm systems
- Systems for alerting and providing instructions to visitors and employees
- Emergency lighting
- Passenger lifts with evacuation circuits that assure functional performance for at least 30 minutes in the incoming cable area under full fire conditions
- Water pressure boosting systems for the supply of extinguishing water
- Ventilating systems of safety stairwells, fire department lifts and machine rooms where functioning must be guaranteed for at least 90 minutes.

In order to be able to offer the required functional endurance for busbar trunking systems, we have, for example (in some cases working together with Promat), had the BD2, LD, LX and LR busbar trunking systems tested successfully at the Materials Testing Institute at Brunswick in Germany.

During fire testing the busbar trunking systems concerned (housed in Promatect plate casings of varying thicknesses) were subjected to an external fire load in compliance with the standard temperature curve (STC) in order to evaluate functional endurance to DIN 4102-12.

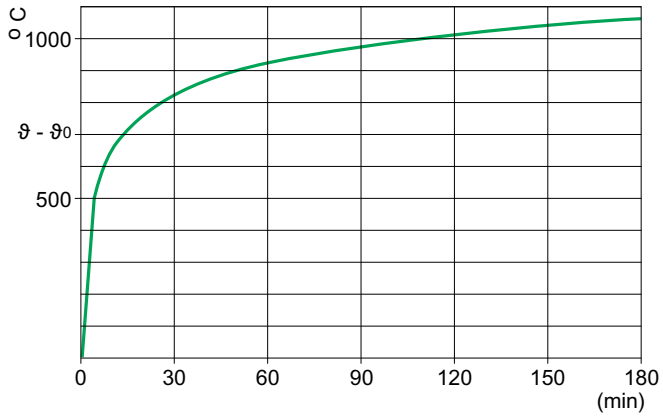


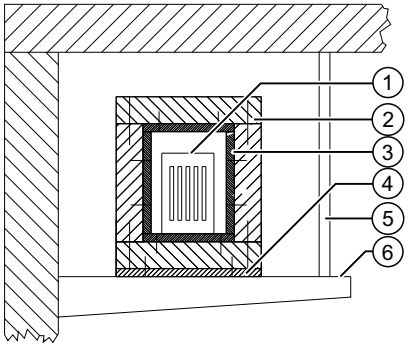
Figure 7-7 Standard temperature curve (STC) to evaluate functional endurance

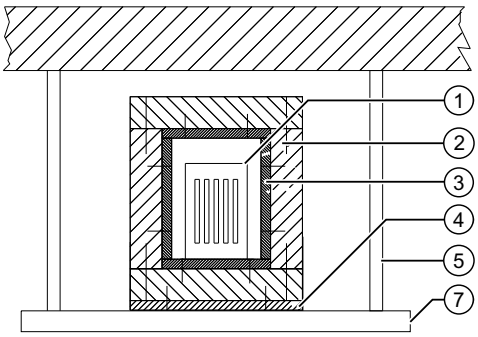
7.3.2 Versions

Components for the functional endurance channel as well as the carrier construction for the channel and BD2, LD and LX busbar trunking systems are vital to compliance with functional endurance requirements. The design of the channel (barriers on 4, 3 and 2 sides) and the carrier construction (fixing with threaded rods or wall-mounted cable brackets) can vary depending on ambient conditions. Observance of/compliance with the specifications of test certification issued by planning authorities is mandatory:

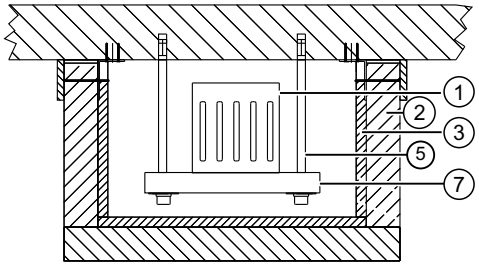
- Observance of the maximum permissible clearances between the mounting points, and a maximum permissible tensile stress of 6 N / mm²
- Only fixing accessories and barrier material/barrier accessories approved by the planning authorities may be used. This material must be provided by the customer and is not included in the scope of delivery of the busbar trunking system.

The following versions can be considered:

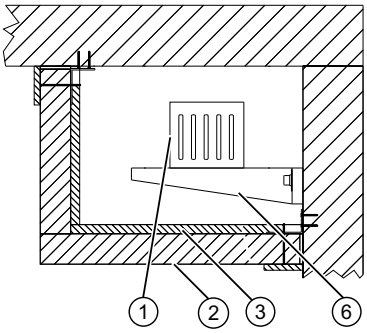




Functional endurance with barrier on 4 sides



Functional endurance with barrier on 3 sides [1)]



Functional endurance with barrier on 2 sides [1)]

① Busbar system
② Barrier
③ Barrier bonded to joint edges
④ Load distribution plate
⑤ Threaded rod (M12/M16)
⑥ Cable bracket according to statics
⑦ Carrier according to statics

All the information you need about the nature and types of barrier and component, as well as a detailed description of carrier constructions, is contained in the planning authority test certificates. Prior to planning, these test certificates must be requested from the product manager.

System	Functional endurance class	Density d [mm]/PROMATE CT plate type	Outside dimensions [2] of the Promat channel (W [mm] x H [mm])	Reduction factor [3] according to functional endurance class and mounting position		
				Horizontal		Vertical
				Edgewise [4]	Flat	
BD2.-160 to 400	E60	40 / LS	288 x 190	0.75	0.7	0.7
	E90	50 / LS	308 x 210	0.7	0.65	0.65
BD2-630 to 1250	E90	40 / LS	250 x 300	0.75	0.7	0.7
LDA1 to LDA3/LDC2, LDC3 (IP34)	E60	20/L500	260 x 260	057 (Al) 0.58(Cu)	-	0.56 (Al) 0.54 (Cu)
	E90	40/L500	300 x 300	0.5 (Al) 0.52 (Cu)	-	0.5 (Al) 0.48 (Cu)
	E120	60/L500	340 x 340	0.45 (Al) 0.46 (Cu)	-	0.45 (Al) 0.43 (Cu)
LDA4 to LDA8/LDC6 to LDC8 (IP34)	E90	20/L500	320 x 260	0.57	-	0.44 (Al) 0.48 (Cu)
	E120	40/L500	360 x 300	0.5	-	0.4 (Al) 0.43 (Cu)
LX.01, LX.02	E60	30 / LS	250 x 250	0.7	0.7	0.7
	E120	50 / LS	290 x 290	0.6	0.6	0.6
LX.03, LX.04	E60	30 / LS	250 x 280	0.7	0.7	0.7
	E120	50 / LS	290 x 320	0.6	0.6	0.6
LX.05	E60	30 / LS	250 x 320	0.7	0.7	0.7
	E120	50 / LS	290 x 360	0.6	0.6	0.6
LX.06, LX.07	E60	30 / LS	250 x 400	0.7	0.7	0.7
	E120	50 / LS	290 x 440	0.6	0.6	0.6
LX.08	E60	30 / LS	250 x 550	0.7	0.7	0.7
	E120	50 / LS	270 x 570	0.65	0.65	0.65
LX.09, LX.10	E60	30 / LS	250 x 710	0.7	0.7	0.7
	E120	50 / LS	270 x 730	0.65	0.65	0.65

[1] Versions with 2 and 3 barriers available for Germany on request.

[2] Outside dimensions are valid for versions with 4 barriers. Dimensions for versions with 3 and 2 barriers are available on request.

[3] The reduction factors are based on the rated current I_e and an ambient temperature of 35 °C (24-hour average). In the event of temperature deviations, reduction factors should be adjusted accordingly.

[4] Mounting position horizontal edgewise.

BD2 (trunking unit)

LD, LX (trunking conductor)

7.4 Fireproof barrier

German building regulations (or other national regulations) require that buildings are constructed in such a way as to "prevent the development and spread of fire and fumes and make possible the rescue of persons and animals as well as fire fighting". Accordingly, neither fire nor fumes are permitted to spread from one floor or fire area to another.

The BD01, BD2, LD, LX and LR busbar trunking systems can be equipped with fireproof barriers. Fireproof barriers are generally subject to the device standard IEC/EN 60439-2 and national regulations, and these can differ from each other. For this reason, we recommend that you contact your SIEMENS representative in the planning phase.

The systems meet the requirements to prove fire resistance periods as per the fire resistance class specifications in ISO 834-1 in accordance with IEC/EN 60439-2.

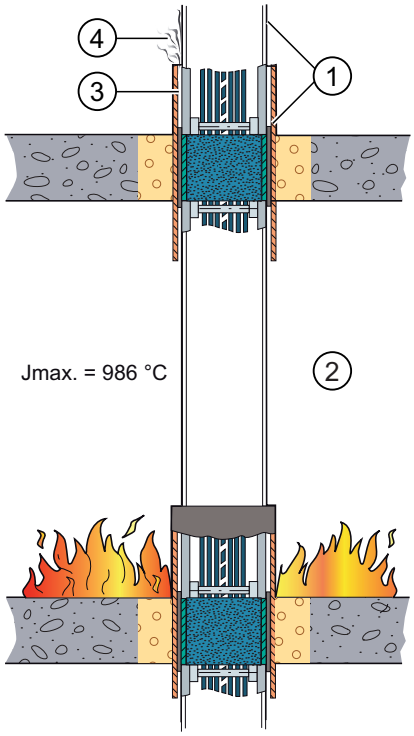


Figure 7-8 Conditions for busbar trunking systems

① Permissible temperature increase on components max. 180°C

② Area on fire: Fire in accordance with standard temperature curve DIN 4102, Sheet 2

③ Permissible temperature increase of escaping air max. 140 °C

④ No flammable gases must be allowed to escape. No fumes likely to impair rescue attempts must be allowed to escape

7.4.1 Versions

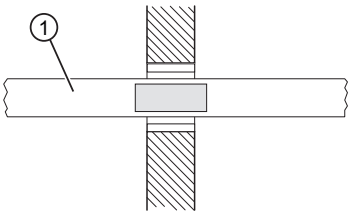
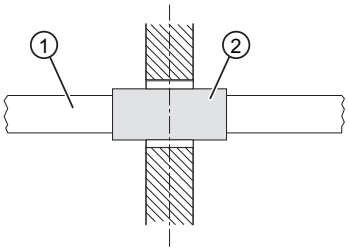
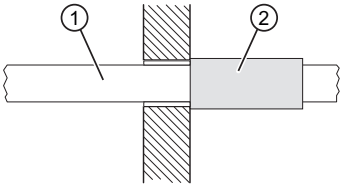
Unlike cable trunking, the busbar trunking systems are supplied ex-works with a fireproof barrier. The fireproofing consists of an inner and outer barrier or an outer barrier only depending on the busbar trunking system.

The fireproof barriers are compliant with fire resistance classes S60, S90 and S120 in accordance with DIN 4102-9 dependent upon version and type.

The fireproof barrier can be installed in the busbar trunking system at the factory (BD2, LD, LX), added on site (BD01, LX, LR) or omitted completely [1] (LR).

[1] Please note the section "Special conditions for the German market".

The type of installation is determined by the structure of the busbar trunking system and the required fire resistance class, as you can see from the overview below (the figures ignore the minimum clearances between the fireproof barrier and the wall, and the fireproof mortar):

Without external fireproof barrier, in the center of the wall/ceiling	With external fireproof barrier, in the center of the wall/ceiling	With external fireproof barrier, in the center of the wall/ceiling
		
Examples		
BD2 with inner fire protection S90 for (wall thickness ≥ 15 cm) BD2 with inner fire protection S120 (wall thickness ≥ 25 cm)	BD2A/BD2C: S120 (wall thickness < 25 cm) LR: S90 [1] LR: S120 [1] BD01: S90 LD: S120 LX: S120	BD01: S90 (fire protection installed on both sides) LX: S120

① Busbar system

② Outer fire barrier

[1] Fire protection installed from LR system takes place on-site after sealing the wall/ceiling with fillers. There is usually no outer fire protection in the wall/ceiling for the LR system.

Fire resistance classes

System	Fire resistance class		
	S60	S90	S120
BD01	1	1	-
BD2A/BD2C	2	2	3
LDA/LDC	3	3	3
LXA/LXC single systems	3, 4	3, 4	3, 4
LXA/LXC double systems	3	3	3
LRA/LRC	5	6	7

1: Locally installable fire protection kit for S90 and S60 for installation in a solid wall/ceiling or stud wall.

2: Fire barrier installed in the system at the factory for S90 and S60 for installation in a solid wall/ceiling.

3: Fire barrier installed in the system at the factory for S120 for installation in a solid wall/ceiling.

4: Optionally also as a locally installable fire protection kit for S120 for installation in a solid wall/ceiling.

5: S60 without system-specific fire barrier for installation on solid wall/ceiling. Test certificates are available.

6: Protective coating to be applied locally for S90 for installation on solid wall/ceiling. Test certificates are available.

7: Protective coating to be applied locally and fire protection kit for S120 for installation on solid wall/ceiling.

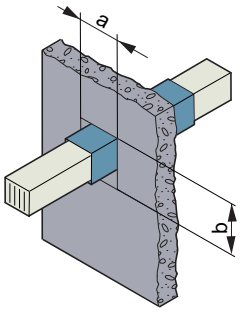
Special conditions for the German market:

The versions for fire barriers described here were created on the basis of tests passed in accordance with DIN 4102 Part 9. In Germany, fireproof barriers must possess general planning authority approval. This is issued by the German Institute for Civil Engineering in Berlin. All divergences from general planning authority approval must be clarified with the product manager for the purpose of applying to the competent regional building authority for agreement in individual cases if necessary.

Fire safety tests have been carried out successfully for the installation of fireproof barriers in stud walls for the BD01, BD2 and LD systems. Please contact the relevant product manager for more detailed information about designs and approvals.

7.4.2 Cut-outs

Recommended dimensions for wall and ceiling cut-outs



System	a [cm]	b [cm]
BD01	19	13
BD2 (160...400)	27	17
BD2 (630...1250)	27	23
LDA1 - 3/LDC2 - 3	42	42
LDA4-8/LDC6-8	48	42
LXA01../LX01..	35	34
LXA02../LXC02..	35	34
LXC03.., LXA04../LXC04..	35	37
LXA05../LXC05..	35	41
LXA06../LXC06..	35	49
LXA07../LXC07..	35	49
LXA08../LXC08..	35	64
LXA09../LXC09.., LXA10..	35	80
LRA01../LRC01.. - LRA03../LRC03..	19	19
LRA04../LRC04..	22	22
LRA05../LRC05.., LRA06../LRC06..	22	25
LRA07../LRC07..	22	29
LRA08../LRC08..	22	32
LRA09../LRC09..	22	34
LRA27../LRC27..	22	48
LRA28../LRC28..	22	56
LRA29../LRC29..	22	64

Note

The area between the busbar wall and the wall cut-out must be filled with mortar or fireproof material; these must meet applicable requirements with regard to the achievement of fire resistance class S90/S120.

Note

Minimum clearance

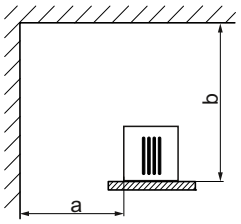
For the installation of SIVACON 8PS busbar systems with fire protection, a minimum clearance of 5 cm must be maintained between the system/system fire protection and the structure in the cut-out. This ensures that there is sufficient space to mount the run, the fixing brackets and for filling with mortar.

7.5 Planning runs

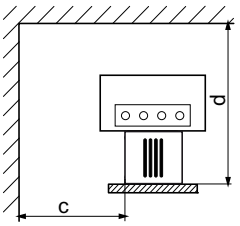
7.5.1 Space requirements for horizontal installation

In order to simplify the mounting of the trunking units and the tap-off units, provision needs to be made for minimum dimensions between the runs and the building structure during planning.

Minimum dimensions for busbar trunking systems with and without tap-off units including system-compliant fixing brackets mounted horizontally on cable racks or wall-mounted cable brackets:



Busbar trunking systems without tap-off units (horizontal installation)



Busbar trunking systems with tap-off units (horizontal installation)

Space requirements

System	Clearances[1]			
	a [cm]	b[2] [cm]	c [cm]	d[3] [cm]
BD2 (160 – 400)	10	16 (20)	30	62
BD2 (630 – 1250)	10	28 (24)	30	68
LDA1 - 3/LDC2 - 3	10	36	35	100
LDA4 - 8/LDC6 - 8	10	36	38	100
LXA01../LXC01..	10	24 (24)	38	123
LXA02../LXC02..	10	24 (24)	38	123
LXC03..	10	27 (24)	38	126
LXA04../LXC04..	10	27 (24)	38	126
LXA05../LXC05..	10	31 (24)	38	130
LXA06../LXC06..	10	39 (24)	38	138
LXA07../LXC07..	10	39 (24)	38	138
LXA08../LXC08..	10	54 (24)	38	153
LXA09../LXC09..	10	70 (24)	38	169
LXA10..	10	70 (24)	38	169
LRA01../LRC01.. - LRA03../LRC03..	10	59 (62)	—[4]	—[4]
LRC04..	10	62 (62)	—[4]	—[4]
LRA05../LRC05.. - LRA06../LRC06..	10	65 (62)	—[4]	—[4]
LRA07../LRC07..	10	69 (62)	—[4]	—[4]
LRA08../LRC08..	10	72 (62)	—[4]	—[4]
LRA09../LRC09..	10	74 (62)	—[4]	—[4]
LRA27../LRC27..	10	88 (62)	—[4]	—[4]
LRA28../LRC28..	10	94 (62)	—[4]	—[4]
LRA29../LRC29..	10	98 (62)	—[4]	—[4]

[1] Clearances are valid for horizontal edgewise mounting of the trunking conductors without taking the enclosure dimensions of incoming cable connection units into account.

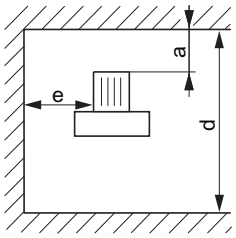
[2] The dimensions in brackets are valid for horizontal flat mounting of the trunking conductors without taking the enclosure dimensions of incoming cable connection units into account.

[3] Clearances are dependent upon the dimensions of the tap-off units. Dimensions are available on request for horizontal flat mounting of trunking units and suspended tap-off units.

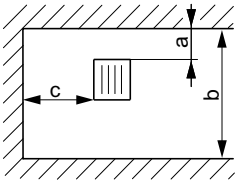
[4] Clearances are dependent upon the dimensions of the tap units. Data on request.

7.5.2 Space requirements for vertical installation

Minimum dimensions for busbar trunking systems with and without tap-off units. The system-specific fixing brackets (not illustrated) have been taken into account in the dimensions specified.



Busbar trunking systems with tap-off units (vertical installation)



Busbar trunking systems without tap-off units (vertical installation)

Space requirements

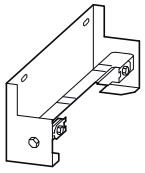
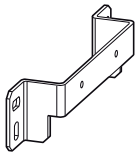
System	Clearances [1]				
	a [cm]	b[2] [cm]	c [cm]	d[4] [cm]	e [cm]
BD2A/BD2C (160 – 400)	5 [2] (3) [3]	19	10	116	30
BD2A/BD2C (630 – 1250)	5 [2] (3) [3]	31	10	120	30
LDA1 - 3/LDC2 - 3	10 [2] (2) [3]	46	10	146	35
LDA4 - 8/LDC6 - 8	10 [2] (2) [3]	46	10	146	38
LXA01../LXC01..	10 [2] (6) [3]	27	15	130	38
LXA02../LXC02..	10 [2] (6) [3]	27	15	130	38
LXC03..	10 [2] (6) [3]	30	15	140	38
LXA04../LXC04..	10 [2] (6) [3]	30	15	140	38
LXA05../LXC05..	10 [2] (6) [3]	34	15	140	38
LXA06../LXC06..	10 [2] (6)[3]	42	15	150	38
LXA07../LXC07..	10[2] (6) [3]	42	15	150	38
LXA08../LXC08..	10 [2] (6) [3]	57	15	170	38
LXA09../LXC09..	10 [2] (6) [3]	73	15	180	38
LXA10..	10 [2] (6) [3]	73	15	180	38
LRA01../LRC01.. - LRA03../LRC03..	10 [2]	69	10	—[5]	—[5]
LRC04..	10 [2]	72	10	—[5]	—[5]
LRA05../LRC05.. - LRA06../LRC06..	10 [2]	75	10	—[5]	—[5]

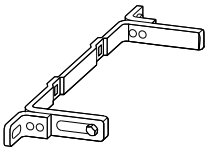
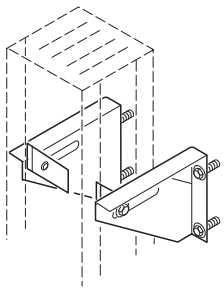
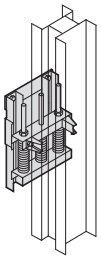
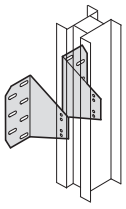
System	Clearances [1]				
	a [cm]	b[2] [cm]	c [cm]	d[4] [cm]	e [cm]
LRC07..	10 [2]	79	10	—[5]	—[5]
LRC08..	10 [2]	82	10	—[5]	—[5]
LRC09..	10 [2]	84	10	—[5]	—[5]
LRC27..	10 [2]	98	10	—[5]	—[5]
LRC28..	10 [2]	104	10	—[5]	—[5]
LRC29..	10 [2]	108	10	—[5]	—[5]

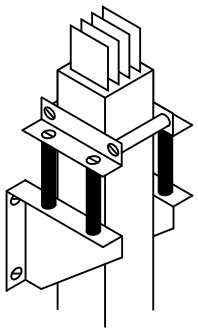
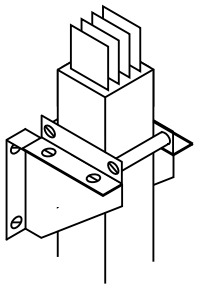
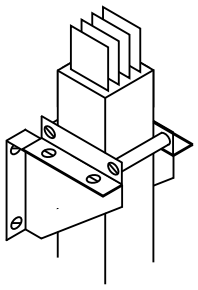
1) The enclosure dimensions of incoming cable connection units have not been taken into account.
2) Clearances apply as minimum dimensions taking into account the recommended cut-out dimensions for fireproof barriers in the ceiling and flush connection between the cut-out and the wall.
3) The reduced dimensions in brackets apply for trunking units without fireproof barriers and are based on space requirements for vertical fixing brackets. If local conditions vary, fillers will need to be used on site.
4) Clearances are dependent upon the dimensions of the tap-off units. The dimensions specified apply for the available tap-off units max. size. Dimensions for smaller sizes are available on request.
5) Clearances are dependent upon the dimensions of the junction boxes. Data on request.

7.5.3 Fixing brackets for vertical mounting

System-specific fixing brackets have to be used to mount the trunking units.

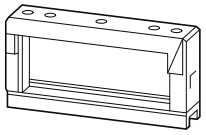
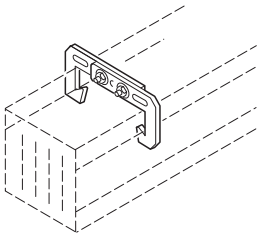
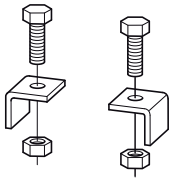
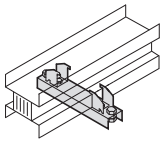
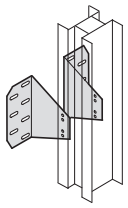
System	Type of bracket	Function	Fixing distances[2]
BD2A/BD2C[1]	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • For wall mounting • For ceiling mounting (-BDV)	7.5 m: up to 400 A 5 m: 630 A 4 m: 800 A...1000 A 3.25 m: 1250 A
	 Fixing bracket with weight carrying capacity (-BVF)	• Support of weight of run • For wall mounting	At every joint block connecting flange (max. 3.25 m)

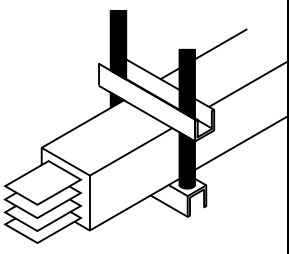
System	Type of bracket	Function	Fixing distances[2)]
	 Spacer brackets (-BD) for busbar runs and distance compensation  Spacer (-DSB)	• Fix clearance from building • For wall mounting	Dependent upon local conditions and planning
LDA/LDC[1)]	 Fixing bracket with weight carrying capacity (-BV)	• Support of weight of run • For wall mounting	At every trunking unit (max. 3.20 m)
LXA/LXC	 Fixing bracket with weight carrying capacity (-BV, -BV-AK)	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting (-BDV)	At an average storey height of 3.40 m to 3.90 m 1 bracket per storey
	 Fixed point bracket	• Fixing the run to the building • For wall mounting	Dependent upon local conditions and planning

System	Type of bracket	Function	Fixing distances[2)]
LRA/LRC	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting (-BVD)	At an average storey height of 3.40 m to 3.90 m 1 bracket per storey
	 Fixed point bracket (-BF)	• Fixing the run to the building • For wall mounting • For ceiling mounting (-BVD)	Dependent upon local conditions and planning
	 Sliding bracket (-BGW)	• Fix clearance from building • Permit proper movement • For wall mounting	Dependent upon local conditions and planning

1) Fixed point brackets are not required due to the type of system.
2) These are recommendations for planning. Please refer to the planning guidelines for max. permissible fixing distances.

7.5.4 Fixing brackets for horizontal installation

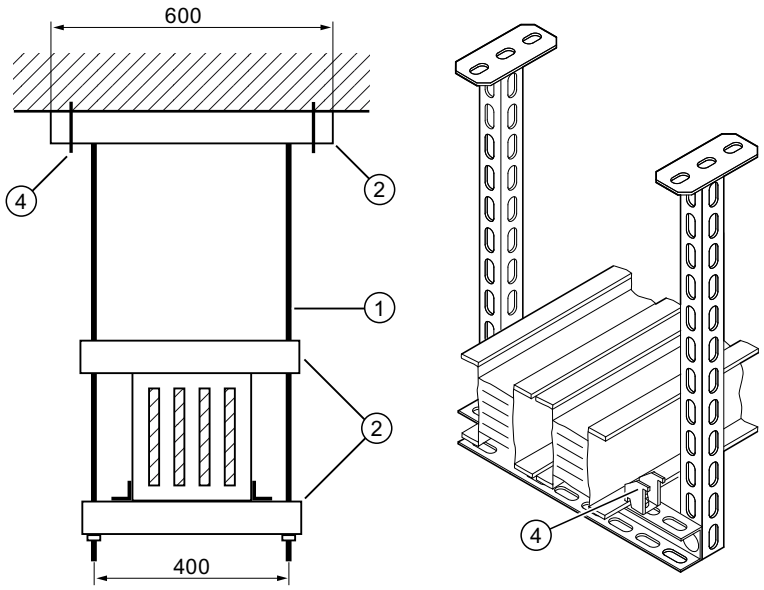
System	Type of bracket	Function	Fixing distances[2)]
BD2A/BD2C[1)]	 Fixing bracket (-BB)	• Run supported or borne • For wall mounting • For ceiling mounting using U-supports or H-supports • For wall mounting using spacers • For fixing on walls and pipe cable brackets	3.25 m: up to 630 A (1 x mount per trunking unit) 2.5 m: up to 1000 A For BD2C and mounting using spacer brackets see Technical data (Page 65)
LDA/LDC [1)]	 Suspension bracket (-B.)	• Bearing the weight of the run • For mounting on U-supports or H-supports	1 x mount per trunking unit for LDA up to 4000 A and LDC up to 4400 A (IP34) 2 m for 5000 A (IP34)
	 Terminal clamp (supplied by the customer)	• For fixing on walls and pipe cable brackets	As suspension bracket
LXA/LXC	 Fixing bracket with weight carrying capacity (-BH, -BF, -K)	• Support of weight of run • Permit proper movement • For mounting (-B.) on ceilings using threaded rods • Mounting (-K) on wall using wall and pipe cable brackets	2 m
	 Fixed point bracket (-BHF, -BFF, -KF)	• Fixing the run to the building • For wall and ceiling mounting (-B.F) • For mounting on fixed point consoles (-KF)	Dependent upon local conditions and planning

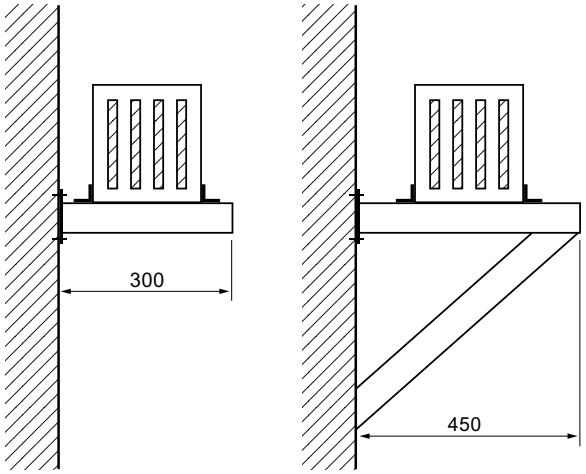
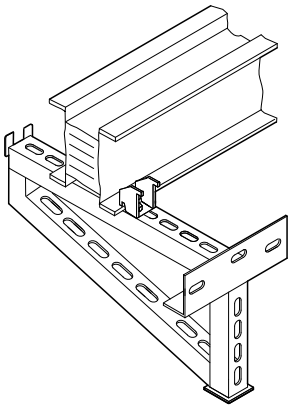
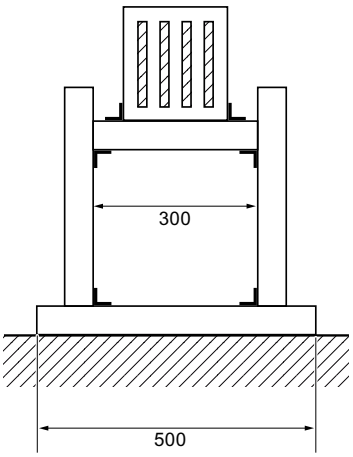
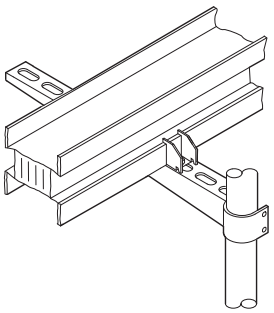
System	Type of bracket	Function	Fixing distances[2)]
LRA/LRC	 Fixing bracket with weight carrying capacity (-BVW)	• Support of weight of run • Permit proper movement • For wall mounting • For ceiling mounting (-BVD)	1.5 m
	Fixed point bracket	• Fixing the run to the building • For wall mounting • For ceiling mounting	Dependent upon local conditions and planning

1) Fixed point brackets are not required due to the type of system.
2) These are recommendations for planning. Please refer to the technical data tables for max. permissible fixing distances.

7.5.5 Carrier constructions

The variety of local structural conditions is reflected in the large number of different technical options for carrier constructions. The most common of these are listed below:

Mounting type	Description
Ceiling: suspended installation 	① Threaded rods or C profiles ② C profiles or top plates ③ Dowel ④ Terminal clamp

Mounting type	Description
Wall: supported installation  	Various beams in accordance with static requirements
Floor: elevated installation  	Most floor-mounted constructions consist of C profiles with connectors or profiles and appropriate accessories.

For more information about system mounting, please refer to the relevant project planning and installation manuals.

7.6 Magnetic fields

General information

Due to their physical characteristics, busbars designed for power distribution and transmission generate pulsating electromagnetic fields in their vicinity with a fundamental frequency of 50 Hz. These magnetic fields can impair the ability of sensitive equipment such as computers or metering instruments to function in full working order.

Limits

EMC directives and the associated standards do not set out requirements or recommendations for the planning of busbar trunking systems. DIN VDE 0100-710 can be consulted in relation to busbar trunking systems used in hospitals.

DIN VDE 0100-710 defines limits for line frequency magnetic fields in hospitals. For example, at 50 Hz, the magnetic induction around a patient's bed must not exceed the following values:

B= 2 x 10^{-7} tesla for EEG

B= 4 x 10^{-7} tesla for ECG

The limit for inductive interference between multi-core cables and lines in a high voltage installation (conductor cross section > 185 mm^2) and the patient beds to be protected is significantly undershot if the minimum clearance of 9 m recommended in DIN VDE 0100-710 is complied with.

When using busbars, this clearance can generally be reduced, since the busbar systems are designed to effectively reduce the magnetic interference fields in the local vicinity.

Magnetic field measurements

However, in order to facilitate evaluation of the busbars to be used, extensive magnetic field measurements have been taken in accordance with EN 60439-2. The magnetic field emissions of the busbar systems were measured on a straight trunking run 9.0 m long. With the busbars under a balanced rated current load, the magnetic fields were measures in eight directions at intervals of 0.1 m and up to a clearance of 1 m.

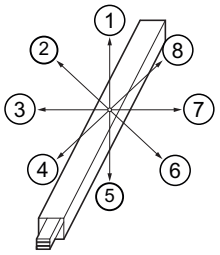


Figure 7-9 Coordinate system for magnetic field measurement

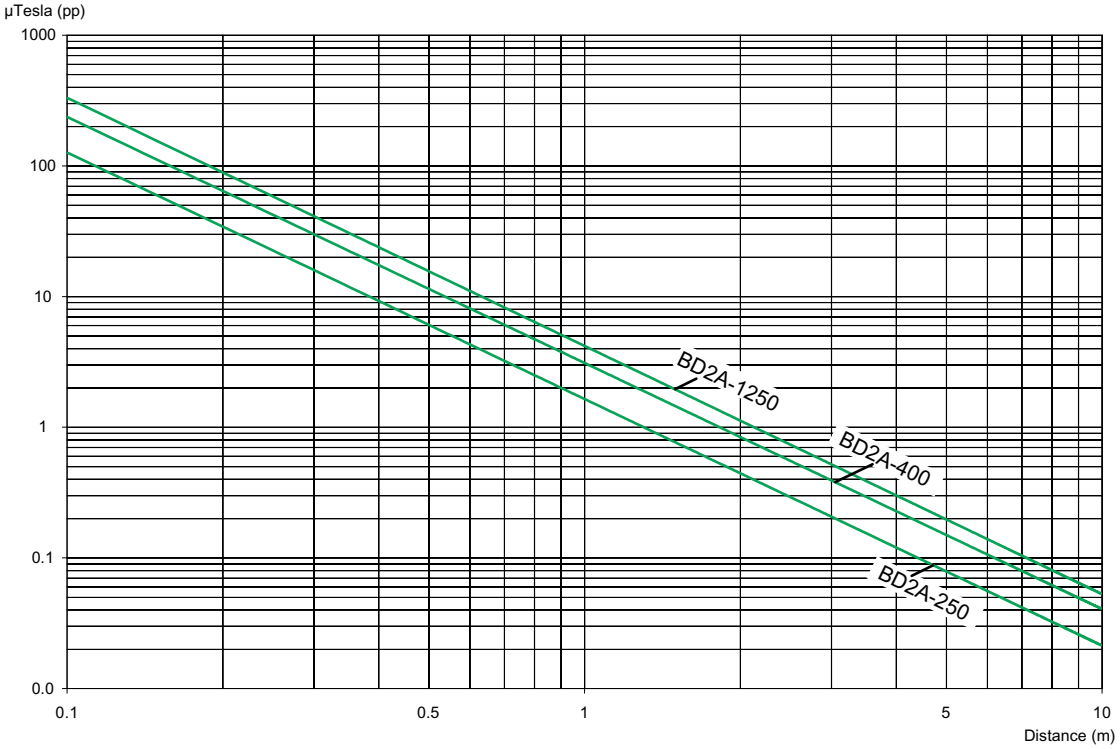


Figure 7-10 BD2 magnetic fields for systems Al 250 A, 400 A, Cu 1250 A

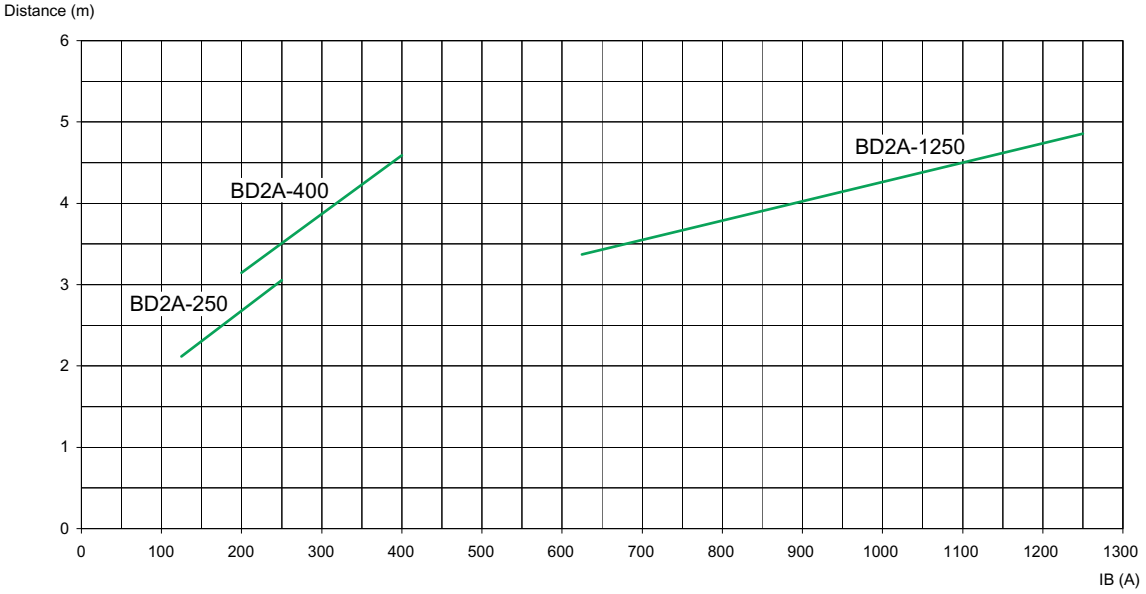


Figure 7-11 BD2 load distance profile for 0.2 µT of systems Al 250 A, 400 A, Cu 1250 A

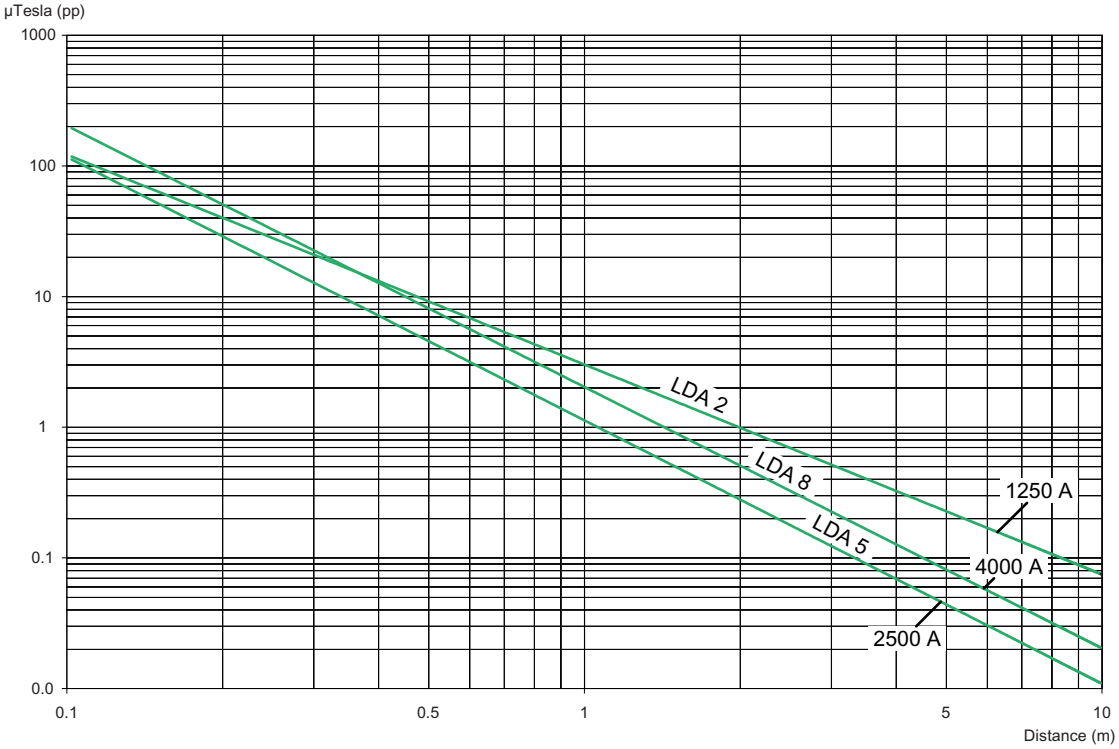


Figure 7-12 LDA magnetic fields for systems Al 1250 A, 2500 A and 4000 A

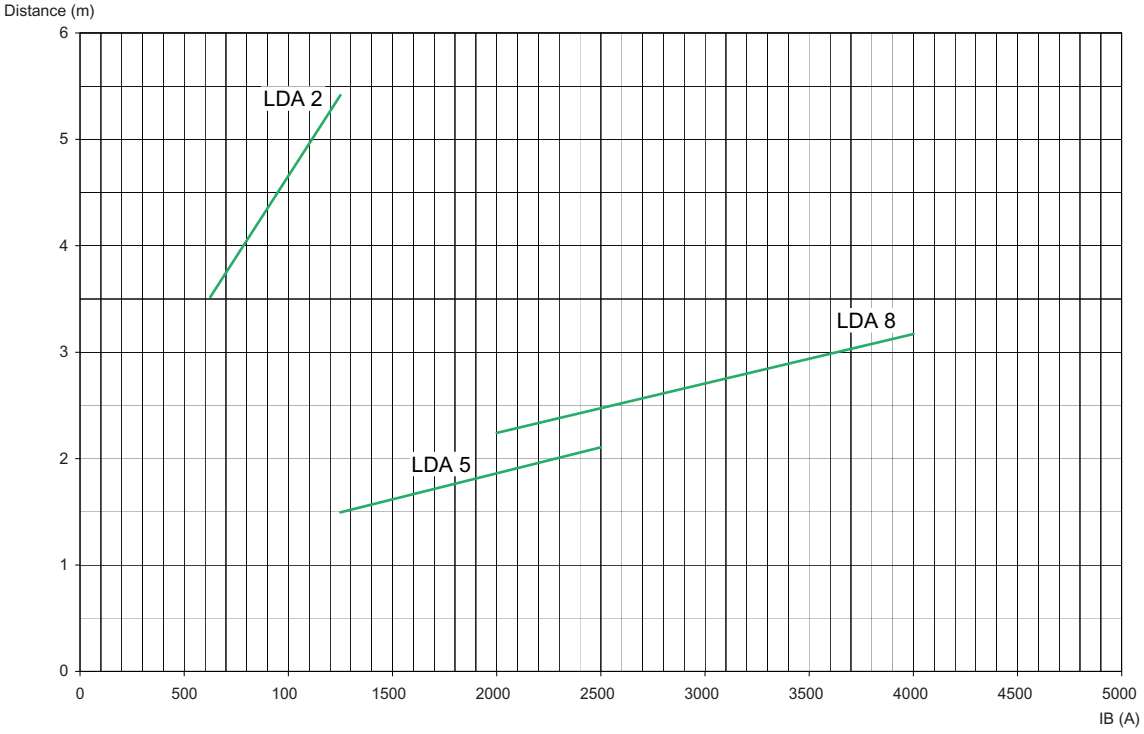


Figure 7-13 LDA magnetic fields for 0.2 µT of systems Al 1250 A, 2500 A and 4000 A

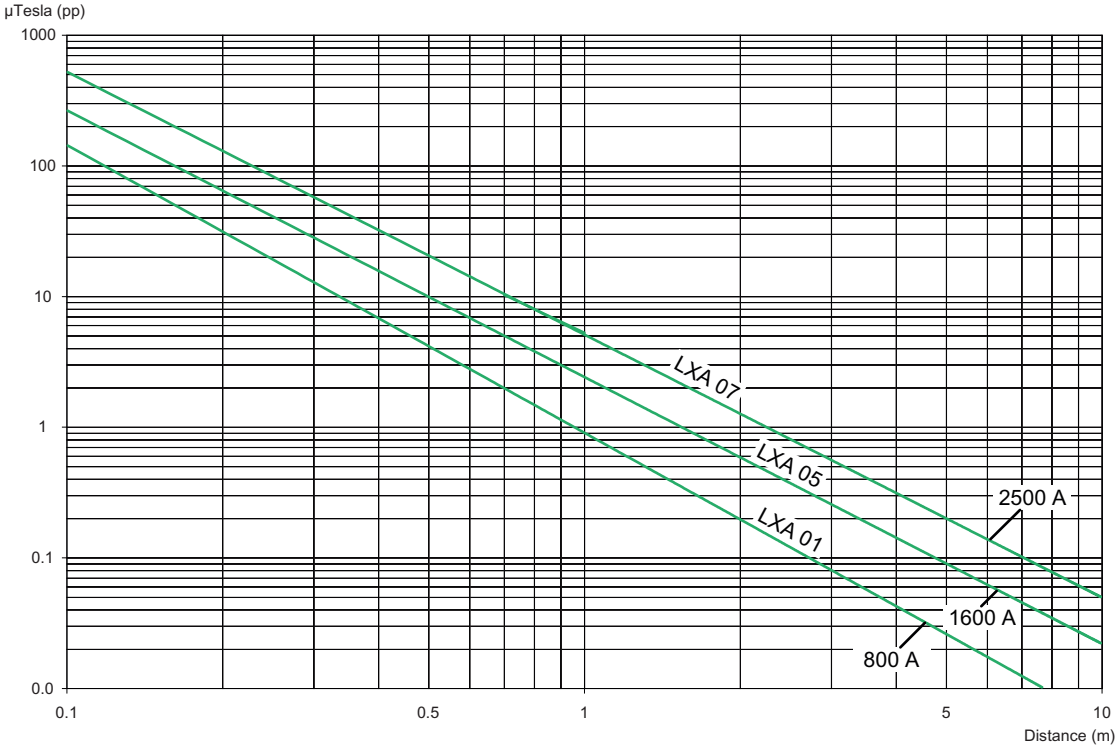


Figure 7-14 LXA magnetic fields for systems 800 A, 1600 A and 2500 A

Figure 7-15 LXA load distance profile for 0.2 µT of systems 800 A, 1600 A and 2500 A

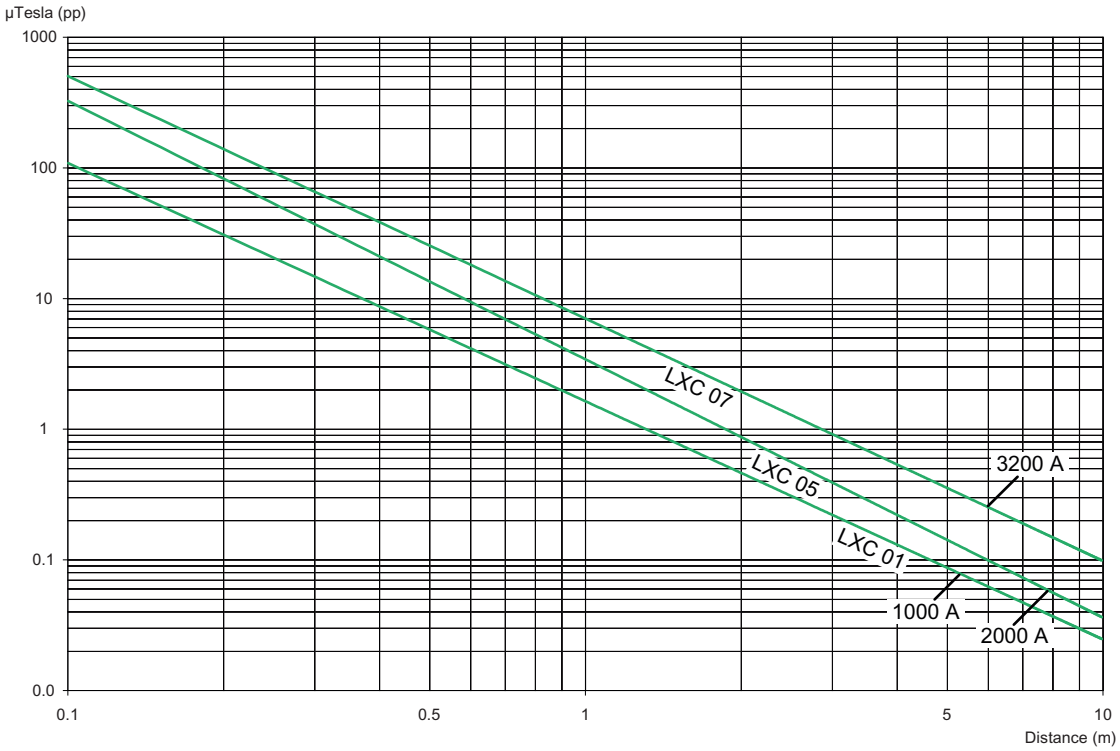


Figure 7-16 LXC magnetic fields for systems 1000 A, 2000 A and 3200 A

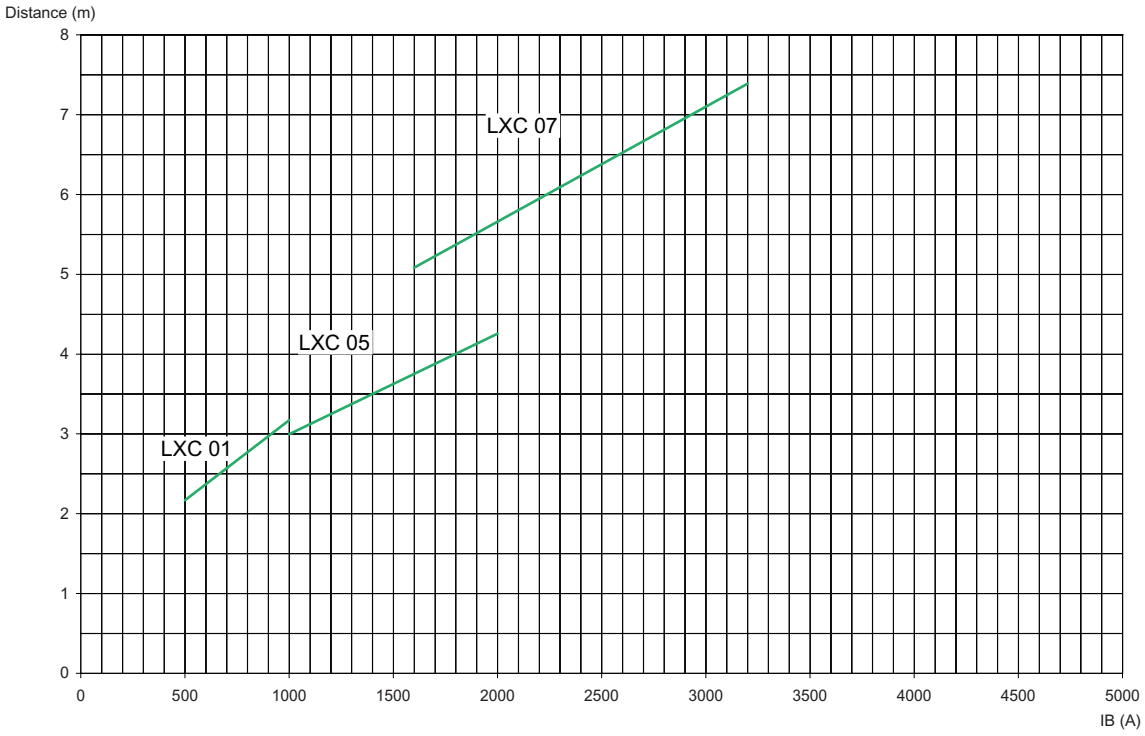


Figure 7-17 LXC load distance profile for 0.2 µT of systems 1000 A, 2000 A and 3200 A

Diagrams for other sizes and for the LR system are available on request.

7.7 Sprinkler test

General information

Sprinkler systems are used for fire prevention and protection in buildings and industrial facilities. Sprinkler systems are automatic fire extinguishing systems. They are designed to detect the outbreak of fire at an early stage and extinguish it as quickly as possible. Once activated for the purpose of extinguishing fire, such systems usually run for at least 30 minutes.

The BD2, LD and LX busbar trunking systems are subjected to a sprinkler test. In the absence of a binding standard, the tests were carried out based on a test structure reflecting practical application (see diagram).

Test results

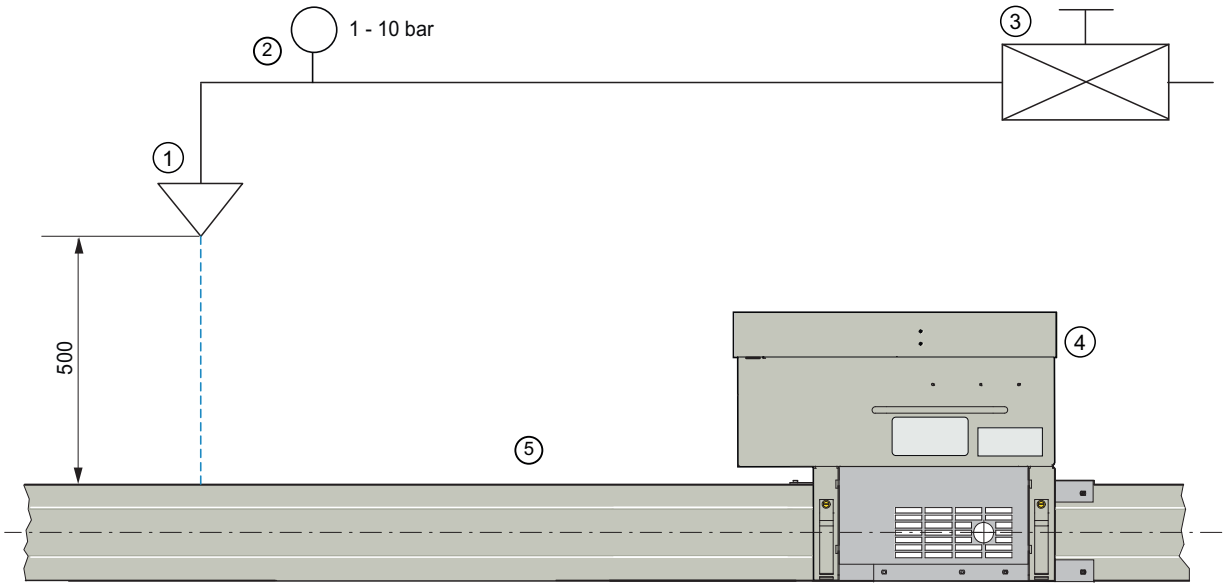
BD2 and LX

All mounting positions of the BD2 and LX busbar trunking systems were tested for water resistance in IP54 degree of protection on the basis of the national risk prevention guidelines for sprinkler systems issued in Germany. Insulation resistance measurements were taken before and after the 90-minute sprinkling period and a high-voltage test was carried out in accordance with EN 60439-2. The equipment passed the test, proving that the busbar system can be put back into operation immediately and without delay once the sprinkler system has run its course.

LD

The LD busbar system with IP34 degree of protection and the associated tap-off units with IP54 protection were sprinkled with both horizontal and vertical trunking runs with a 3/4" umbrella sprinkler and a 1/2" flat spray sprinkler at a water pressure of 6 bar. In order to be able to assess electrical performance during testing, insulation resistance measurements were taken during the course of the test. No operational failures occurred.

Even when subject to extreme water loads such as those associated with sprinkler systems, the LD busbar system is able to remain in full working order. This operational reliability is made possible on the one hand by the generous creepages and clearances and on the other by the fact that water can drain away unhindered.



① Sprinkler
② Pressure gauge
③ Shut-off valve
④ Tap-off unit
⑤ Trunking unit

Figure 7-18 Diagram of sprinkler test

7.8 Tools and services

SIMARIS design

Software tool for fast, effective network designing and dimensioning of electrical power distribution for utility and industrial buildings from the medium voltage supply to the load:

- Dimensioning of electrical systems on the basis of real products in accordance with the state of the art and applicable standards (VDE, IEC)
- Automatic selection of the appropriate components from the stored product database
- Option of saving frequently required modules in the Favourites library
- High level of planning reliability coupled with flexibility in the planning and implementation process
- Option of automatic selectivity assessment with the professional version: selectivity limits are automatically displayed in addition to the current-time curve and the relevant envelope curves

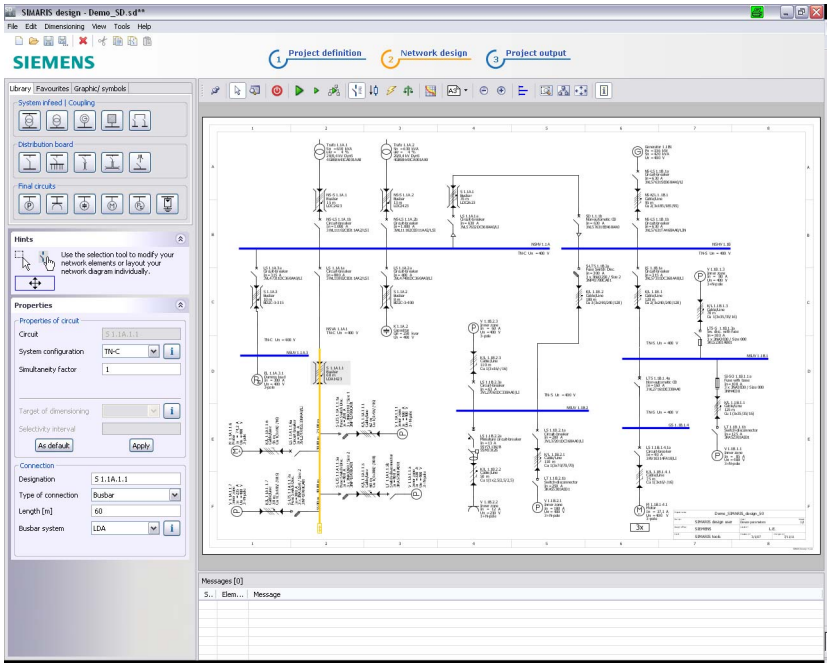


Figure 7-19 SIMARIS design

SIMARIS project

Software tool for fast calculation of space requirements and the electrical power distribution budget for utility and industrial buildings, as well as the drafting of tender specifications:

- Automatic selection and positioning of the suitable systems using the parameters entered
- Quick overview of space requirements and budget
- System-wide planning from the medium voltage supply to the distribution board
- Easy adaptation of the project planning in specific cases, even with changes of use or expansions
- Saving of planned systems in the Favourites library for further use in similar projects
- Automatic generation of specifications for planned systems

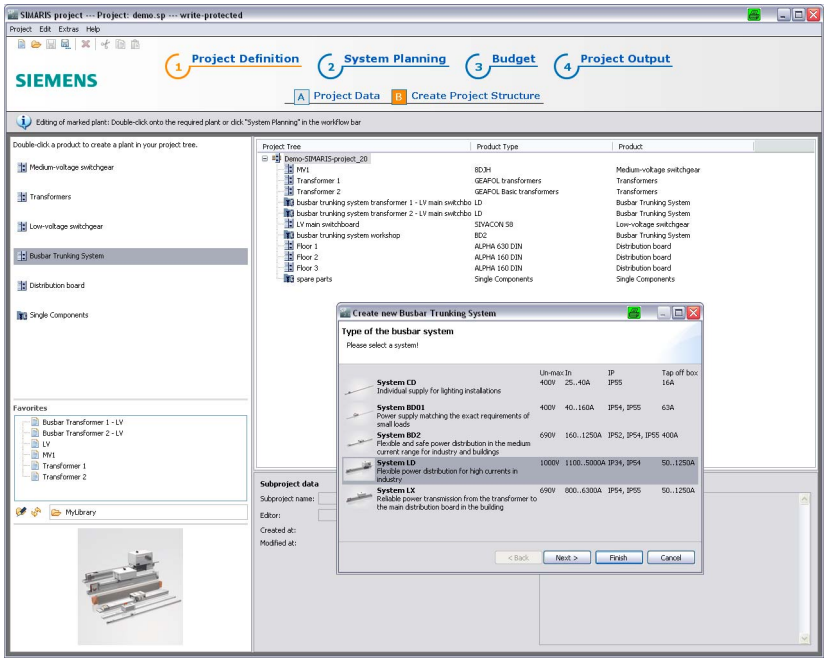


Figure 7-20 SIMARIS project

SIMARIS curves

Software tool for visualizing and evaluating characteristic curves of low-voltage protective devices and fuses (IEC) including the option of simulating device settings:

- Visualisation of tripping characteristics, let-through currents, and let-through energy characteristics
- Devices selected using order number or by entering known technical data via the selection aids
- Saving of frequently required devices as favourites
- Saving of several characteristic curves including selected settings as overall project

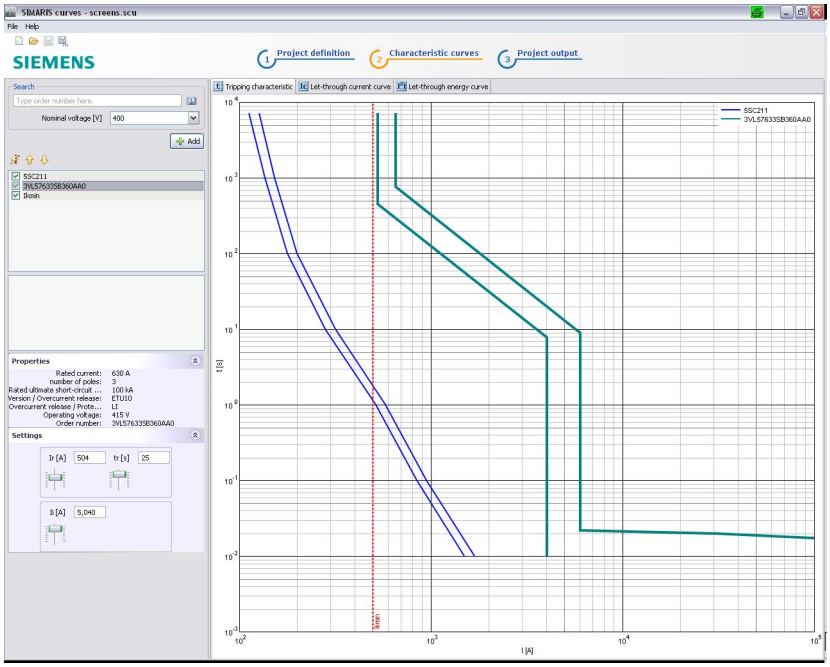


Figure 7-21 SIMARIS curves

Further information for electrical power distribution

You can find additional information on the Internet under:

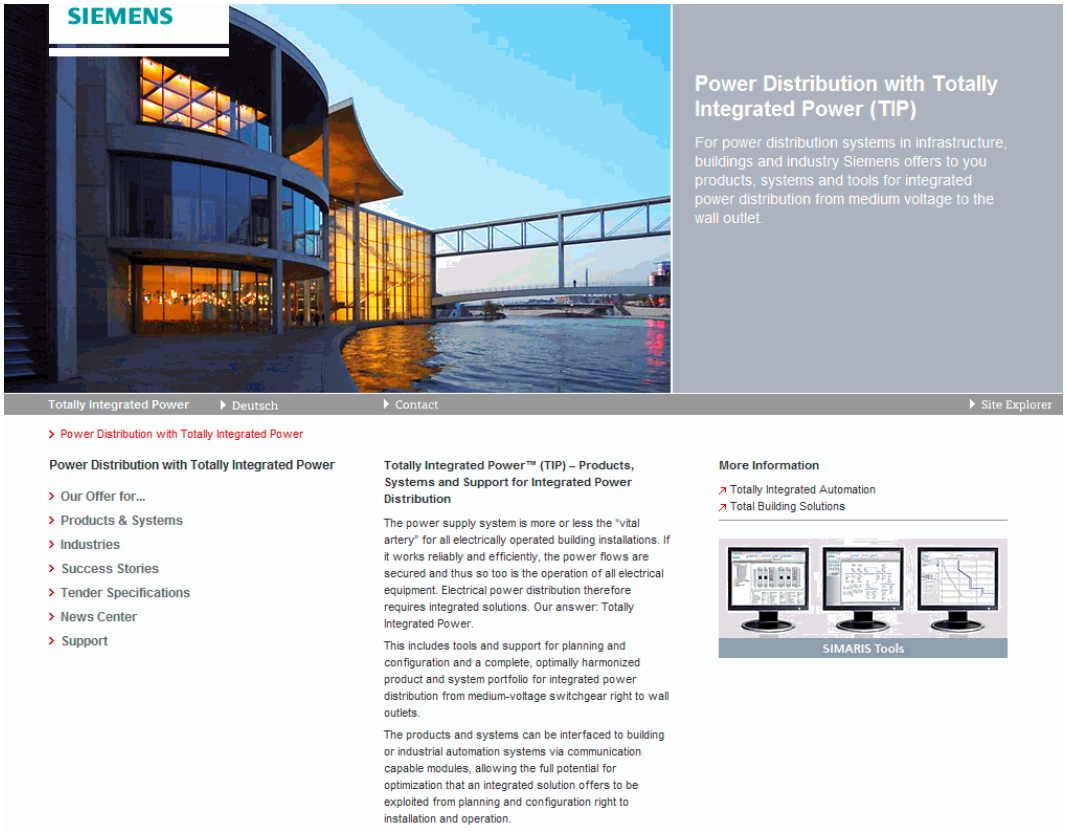


Figure 7-22 Start page "Electrical power distribution with Totally Integrated Power (TIP)"

Totally Integrated Power

The SIVACON 8PS busbar trunking systems are part of the comprehensive product portfolio of Totally Integrated Power, the Siemens solution for system-wide electrical power distribution in industrial applications, infrastructure, and buildings. With technical manuals and software tools for planning power distribution, as well as online tender specifications, we support you in the different planning phases.

You will find all these documents and information on our start page www.siemens.com/tip.

Glossary

A

The manufacturers of low-voltage switchgear and controlgear assemblies specify rated values in compliance with DIN EN 60439-1. These rated values apply to specified operating conditions and characterise the suitability of a switchgear assembly. The rated values must always be referred to when combining equipment or configuring switchgear and controlgear assemblies.

Rated short-time withstand current (I_{cw}) DIN EN 60439-1; 4.3

As the rms value of the short-circuit current, the rated short-time withstand current characterises the thermal strength of a switchgear and controlgear assembly circuit under a transient load. The rated short-time withstand current is normally determined for a duration of 1 s; divergent time values must be specified. The rated short-time withstand current is specified for the trunking and/or main busbars of a switchgear and controlgear assembly.

Rated peak withstand current (I_{pk}) DIN EN 60439-1; 4.4

As the peak value of the impulse current, the rated peak withstand current characterises the dynamic strength of a circuit in a switchgear and controlgear assembly. The rated peak withstand current is specified for the trunking and/or main busbars of a switchgear and controlgear assembly.

Rated conditional short-circuit current (I_{cc}) DIN EN 60439-1; 4.5

The conditional rated short-circuit current corresponds to the uninfluenced short-circuit current that a circuit in a switchgear and controlgear assembly, protected by a short-circuit protective device, can carry without damage (for a certain time). The conditional rated short-circuit current is therefore specified for tap-off units and/or infeeds with circuit breakers, for example.

Rated impulse withstand voltage (U_{imp}) DIN EN 60947-1; 4.3.1.3

This is a measure of the strength of the air paths in the interior of the switchgear in relation to transient overvoltages. Suitable switchgear can be used to ensure that deactivated parts of a system cannot transmit overvoltages from the line on which they are used.

Rated current (In) (of a circuit of a switchgear and controlgear assembly) DIN EN 60439-1; 4.2

The rated current of a circuit of a switchgear and controlgear assembly is specified by the manufacturer and depends on the rated values of the individual items of electrical equipment in the circuit within the switchgear and controlgear assembly, their arrangement, and type of use. The circuit must be able to carry the rated current without the overtemperatures on the individual components exceeding the limit values defined in 7.3 (table 2) when tested according to 8.2.1.

Rated current (I_n) (of a circuit breaker) DIN EN 60947-2; 4.3.2.3

The current that is identical, for the circuit breaker, to the rated continuous current and the conventional thermal current.
➞ Rated uninterrupted current

Rated control voltage (U_c) DIN EN 60947-1; 4.5.1

This is the voltage that is applied to the normally-open actuation contact in a control circuit. It may deviate from the rated control supply voltage due to transformers or resistors in the switching circuit.

Rated conditional service short-circuit breaking capacity (I_{cs}) DIN EN 60947-2; 4.3.5.2.2

The short-circuit current dependent on the rated operating voltage that a circuit breaker is capable of repeatedly breaking (test O - CO - CO, previously P - 2). After short-circuit breaking, the circuit breaker is able to continue carrying the rated current with increased intrinsic heating and can trip under an overload.
➞ Rated uninterrupted current; Rated operating voltage

Rated operating power DIN EN 60947-1; 4.3.2.3

The power that a switching device can switch at the assigned rated operating voltage in compliance with the utilisation category, e.g. circuit breaker utilisation category AC 3: 37 kW at 400 V.

Rated operating voltage (U_e) DIN EN 60947-1; 4.3.1.1

Voltage to which the characteristic values of a switching device apply. The highest rated operating voltage must never be higher than the rated insulation voltage.
➞ Rated insulation voltage

Rated operating current (I_e) DIN EN 60947-1; 4.3.2.3

The current that a switching device can carry, taking into account the rated operating voltage, the operating duration, the utilisation category and the ambient temperature.
➞ Rated operating voltage

Rated uninterrupted current (I_u) DIN EN 60947-1; 4.3.2.4

The current that a switching device can carry during continuous operation (for weeks, months or years).

Rated making capacity DIN EN 60947-1; 4.3.5.2

The current that a switching device can make in compliance with the utilisation category at the respective rated operating voltage.
➞ Rated operating voltage

Rated frequency DIN EN 60947-1; 4.3.3

The frequency for which a switching device is designed and on which the other characteristic data is based.
➞ Rated operating voltage; Rated uninterrupted current

Rated ultimate short-circuit breaking capacity (I_{cu}) DIN EN 60947-2; 4.3.5.2.1

The maximum short-circuit current that a circuit breaker is capable of breaking (test O - CO, previously P - 1). After short-circuit breaking, the circuit breaker is capable of tripping under an overload, with increased tolerances.

Rated insulation voltage (U_i) DIN EN 60947-1; 4.3.1.2

Voltage to which insulation tests and creepage paths apply. The highest rated operating voltage must never be higher than the rated insulation voltage.
➞ Rated operating voltage

Rated short-circuit breaking capacity (I_{cn}) DIN EN 60947-1; 4.3.6.3

The highest current that a switching device can break at rated operating voltage and frequency without damage. It is specified as an rms value.
➞ Rated operating voltage

Rated short-circuit making capacity (I_{cm}) DIN EN 60947-1; 4.3.6.2

The highest current that a switching device can make at a specific rated operating voltage and frequency without damage. Contrary to the other characteristic data, it is specified as a peak value.
➞ Rated operating voltage

Conditional short-circuit current, rated DIN EN 60947-1; 2.5.29

➞ Rated conditional short-circuit current (I_q)

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